

Rock Products

CHICAGO

EDITORIAL DEPARTMENT—

BUSINESS DEPARTMENT—

EASTERN OFFICE—

CIRCULATION DEPARTMENT—

SUBSCRIPTION—Two dollars a year to U. S. and Possessions. Three dollars a year to Canada and foreign countries. Twenty-five cents for single copies.

POST-OFFICE ENTRY—Entered as second-class matter, July 2, 1907, at the Chicago, Ill., Post-office, under the Act of March 3, 1879.

TRADEPRESS PUBLISHING CORP.
542 South Dearborn Street, Chicago, Ill.

TABLE OF CONTENTS

FEATURE ARTICLES

Editorial Cartoon	35
Review of the Rock Products Industry—Editorial	36, 37, 38
<i>Editorial interpretation of the opinions of several hundred producers regarding causes of 1920 disaster and the prospects of transportation, labor and prices for 1921.</i>	
Lime Industry Reviewed	39, 40
<i>President of National Lime Association sees great future for building industry.</i>	
Crushed Stone Industry Reviewed	41, 42
<i>President of National Crushed Stone Association sees quarry industry soon coming to its own.</i>	
Sand and Gravel Industry Reviewed	43
<i>President of National Association of Sand and Gravel Producers tells of big fight for transportation.</i>	
Cement Industry Reviewed	44
<i>Past President of Portland Cement Association sees no cement shortage in 1921.</i>	
Gypsum Industry Reviewed	45
<i>President of the Gypsum Industries Association is optimistic.</i>	
Phosphate Industry Reviewed	46
<i>Prominent Mt. Pleasant producer outlines problems of the Tennessee rock phosphate industry.</i>	
New Salt Lake City Sand and Gravel Plant	47, 48, 49, 50, 51
<i>Utah Sand and Gravel Co. has model plant with many unusual details.</i>	
Chemistry for Lime and Cement Manufacturers	54, 55
<i>Chemistry of fuels combined.</i>	
Use of Pyrometers in Lime Kiln Operation	56, 57, 58, 59
<i>Scientific control of shaft kiln operation increases efficiency and saves fuel.</i>	
Annual Meeting of the Missouri Valley Sand and Gravel Producers Association	60
<i>Freight rates and transportation most discussed.</i>	
National Association of Sand and Gravel Producers After Esch-Cummings Law	61
<i>Charles M. Sutton prepares changes in law asked by construction industry.</i>	
United States Commerce Commission to Compile Statistics on Mineral Aggregate Rates	62
The Slate Industry	63
<i>Prominent Pennsylvania slate quarry man summarizes conditions and prospects.</i>	
New Plant of the Bessemer Limestone and Cement Company; Part 1	65, 66, 67, 68, 69, 70, 71, 72, 73
<i>Probably the most up-to-date wet-process cement plant in the world.</i>	
Railway Rates and Transportation the Big Issues in 1921	74, 75, 76
<i>Presidents of big railway systems tell Rock Products their attitude on mineral aggregate rates.</i>	
Review of Price Fluctuations in 1920	78, 79, 80, 81, 82, 83
<i>Seasonal and average prices of various rock products.</i>	

DEPARTMENTS

Hints and Helps for the Superintendent.....	52, 53
Editorial Comment	77
General News	63, 64
Accident Prevention	84
New Machinery and Equipment	85
Current Prices of Rock Products	86, 87, 88, 89
News of the Industries	90

For Index to Advertisements See Page 119

The Only Journal With a Paid Circulation in the Rock Products Industry

Rock Products

Vol. XXIV, No. 1

CHICAGO

January 1, 1921

EDITORIAL DEPARTMENT—

Nathan C. Rockwood, Editor
Chas. A. Breskin, Assistant Editor

BUSINESS DEPARTMENT—

Geo. P. Miller, Manager.

EASTERN OFFICE—

Chas. H. Fuller, Manager, 101 West
41st Street, New York City, N. Y.

CIRCULATION DEPARTMENT—

H. J. Wolfe, Manager. Circulation
5300 copies net. Applicant for mem-
bership Audit Bureau of Circulation.

SUBSCRIPTION—Two dollars a year
to U. S. and Possessions. Three dol-
lars a year to Canada and foreign
countries. Twenty-five cents for sin-
gle copies.

TO SUBSCRIBERS—Date of wrapping
indicates issue with which your sub-
scription expires. In writing to have
address changed, give old as well as
new address.

POST-OFFICE ENTRY—Entered as
second-class matter, July 2, 1907, at
the Chicago, Ill., Post-office, under
the Act of March 3, 1879.

PUBLICATION—Published every other
Saturday by

TRADEPRESS PUBLISHING CORP.
542 South Dearborn Street, Chicago, Ill.

W. D. Callender, President.
T. J. Sullivan, Vice-President.
Geo. P. Miller, Treasurer.
C. O. Nelson, Secretary.

TABLE OF CONTENTS

FEATURE ARTICLES

Editorial Cartoon	35
Review of the Rock Products Industry—Editorial	36, 37, 38
<i>Editorial interpretation of the opinions of several hundred pro- ducers regarding causes of 1920 disaster and the prospects of transportation, labor and prices for 1921.</i>	
Lime Industry Reviewed	39, 40
<i>President of National Lime Association sees great future for building industry.</i>	
Crushed Stone Industry Reviewed	41, 42
<i>President of National Crushed Stone Association sees quarry industry soon coming to its own.</i>	
Sand and Gravel Industry Reviewed	43
<i>President of National Association of Sand and Gravel Producers tells of big fight for transportation.</i>	
Cement Industry Reviewed	44
<i>Past President of Portland Cement Association sees no cement shortage in 1921.</i>	
Gypsum Industry Reviewed	45
<i>President of the Gypsum Industries Association is optimistic.</i>	
Phosphate Industry Reviewed	46
<i>Prominent Mt. Pleasant producer outlines problems of the Ten- nessee rock phosphate industry.</i>	
New Salt Lake City Sand and Gravel Plant	47, 48, 49, 50, 51
<i>Utah Sand and Gravel Co. has model plant with many unusual details.</i>	
Chemistry for Lime and Cement Manufacturers	54, 55
<i>Chemistry of fuels combined.</i>	
Use of Pyrometers in Lime Kiln Operation	56, 57, 58, 59
<i>Scientific control of shaft kiln operation increases efficiency and saves fuel.</i>	
Annual Meeting of the Missouri Valley Sand and Gravel Producers Association	60
<i>Freight rates and transportation most discussed.</i>	
National Association of Sand and Gravel Producers After Esch- Cummings Law	61
<i>Utah Manager Sutton prepares changes in law asked by con- struction industry.</i>	
Interstate Commerce Commission to Compile Statistics on Mineral Aggregate Rates	62
The Slate Industry	63
<i>Prominent Pennsylvania slate quarry man summarizes conditions and prospects.</i>	
New Plant of the Bessemer Limestone and Cement Company; Part 1	65, 66, 67, 68, 69, 70, 71, 72, 73
<i>Probably the most up-to-date wet-process cement plant in the world.</i>	
Railway Rates and Transportation the Big Issues in 1921	74, 75, 76
<i>Presidents of big railway systems tell Rock Products their atti- tude on mineral aggregate rates.</i>	
Review of Price Fluctuations in 1920	78, 79, 80, 81, 82, 83
<i>Seasonal and average prices of various rock products.</i>	

DEPARTMENTS

Hints and Helps for the Superintendent	52, 53
Editorial Comment	77
General News	63, 64
Accident Prevention	84
New Machinery and Equipment	85
Current Prices of Rock Products	86, 87, 88, 89
News of the Industries	90

For Index to Advertisements See Page 119



A New BROWNHOIST

For several years there has been a growing demand for a high grade locomotive crane of small capacity. An experience of over 25 years of locomotive crane building had qualified Brownhoist to fill this need. And so, two years ago we set out to build such a crane. A thorough knowledge of the handling conditions peculiar to each industry was our working basis. And each part was planned with an understanding of the work our customers would demand of their cranes.

After the first crane was completed, many tests were made for over a year and under hard working conditions. Only after these tests were finished to

our complete satisfaction were we willing to offer this crane as a Brownhoist product. In recommending to you this No. 2 Brownhoist crane we believe it will give the same long, dependable service that the larger Brownhoists are now giving.

This new Brownhoist, within its capacity, can do everything the larger types are doing. Bucket, magnet or hook work are all a part of a day's job. And it will switch loaded cars. Steam, electric or gasoline engine drive can be supplied, on railroad or Brownhoist Creeper Trucks. Catalog K shows this new Brownhoist along with the larger models. May we send you a copy.

The Brown Hoisting Machinery Company

40 Years in Crane Business

Engineers and Manufacturers of Heavy Dock Machinery, Bridge Cranes, etc., as well as smaller Cranes and Hoists.

Cleveland, Ohio, U. S. A.

Branch Offices in New York, Pittsburgh, Chicago and San Francisco
European Rep., H. E. Hayes, 12 Rue de Phalsbourg, Paris.

When writing advertisers please mention ROCK PRODUCTS

Measuring Telsmith Crushers

The standards ordinarily employed in comparing coarse crushers are misleading. Breakers are usually bought according to *width* of receiving opening. The *length* of the receiving opening is disregarded. The bottom diameter and depth of the bowl, the concave and head areas are all ignored. And how many engineers ever thought to measure the length of the crushing stroke at the top of the head? And yet all these elements are important in determining the capacity of a coarse crusher and the size of rock it will take.

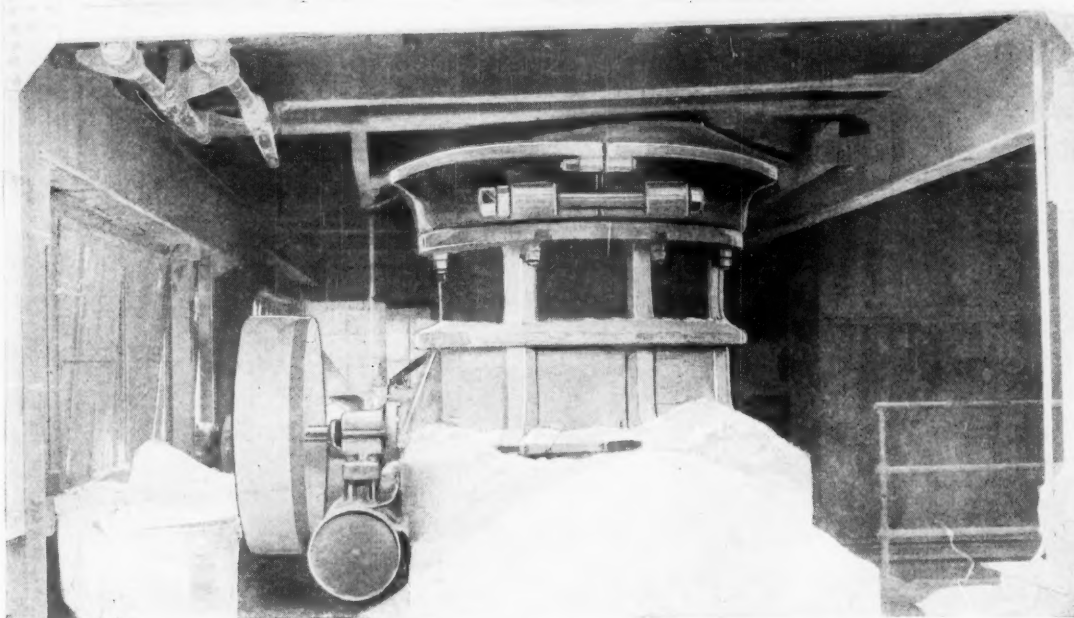
For instance—here is a No. 7½ Telsmith Primary Breaker, with two 14 in. x 70 in. feed openings. The crushing pinch at the top of the head is 11/16 in. The top diameter of the concave circle is 57 in. The bottom diameter is 48 in. The crushing cone measures 29 in. (top diam.) by 41½ in. (bottom diam.) by 34 in. (height).

Contrast these measurements with a typical No. 7½ of lever-shaft design, having two 14 in. x 52 in. feed openings. The crushing pinch at the top of the head is only about ¾ in., when brand new. The top diameter of the concave circle is 49 in. The bottom diameter is 31 in. The crushing cone measures 22 in. x 31 in. x 34½ in.

These two machines are commonly ranked as crushers of equal receiving opening and capacity, merely because the receiving openings are of the same width. Need we emphasize further the fallacy of this practice?

Glad to send you catalog No. 166 (Telsmith Primary Breaker) and Bulletin No. 2-F-11 (Telsmith Reduction Crusher).

SMITH ENGINEERING WORKS
3188 Locust St., Milwaukee, Wis.



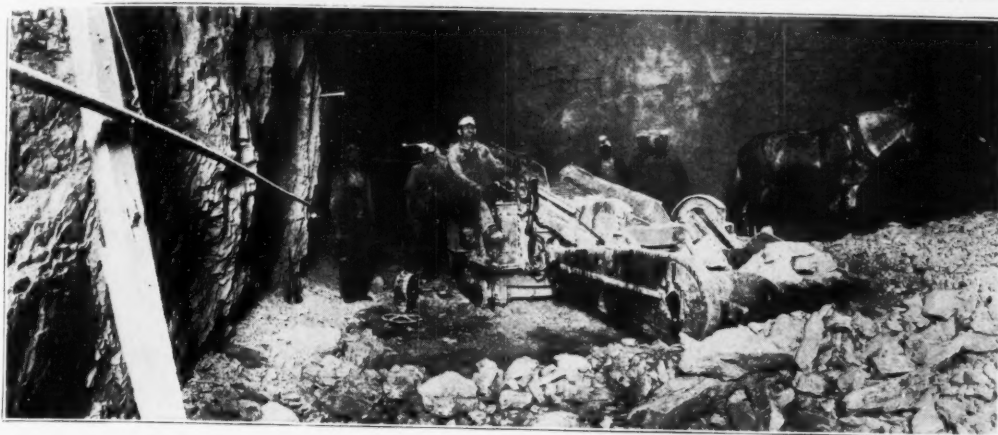
When writing advertisers please mention ROCK PRODUCTS

Local Offices:

Old Colony Bldg.
Chicago, Ill.
50 Church St.
New York City
710 Witherspoon Bldg.
Philadelphia, Pa.
930 Oliver Bldg.
Boston, Mass.
110 W. Park Way, N. S.
Pittsburgh, Pa.
325 W. Main St.
Louisville, Ky.
506 So. Peters St.
New Orleans, La.
Chester, Fla.
2540 University Ave.
St. Paul, Minn.
523 Boston Bldg.
Denver, Colo.
Salt Lake Hardware Co.
Salt Lake City, Utah
617 Hollingsworth Bldg.
Los Angeles, Calif.
625 Market St.
San Francisco, Calif.
Old National Bank Bldg.
Spokane, Wash.

Canadian Representatives:

Canadian Ingersoll Rand Co.
Montreal, P. Q.



Shovel away the High Cost *with a* **Myers-Whaley**

The above shows a MYERS-WHALEY No. 4 SHOVELING MACHINE in a Portland Cement Company's limestone mine, where it has averaged 254 tons per shift. This company has three of these machines, another cement company has four. Over 90 Standard No. 4 Machines are now in service—saving men and lowering costs.

Machine is self propelled and can be moved from one working place to another at the rate of 70 feet per minute. Crew consists of one operator, one car coupler and a helper. Machine has a capacity of a ton a minute, and handles lumps up to 1,000 pounds. Is equipped for either compressed air or electricity, and adapted to any track gauge. Catalog and treatise sent on request.

MYERS-WHALEY COMPANY, Knoxville, Tenn.

LIST OF AGENTS

F. A. Perry, 63 Queen Victoria St., London, E. C. 4.

Diény & Lucas, 50 Rue Talbott, Paris.

J. P. Cotter, P. O. Box 584, Sydney, Nova Scotia.

Maskin K. Lund Co., Kristiania, Norway.

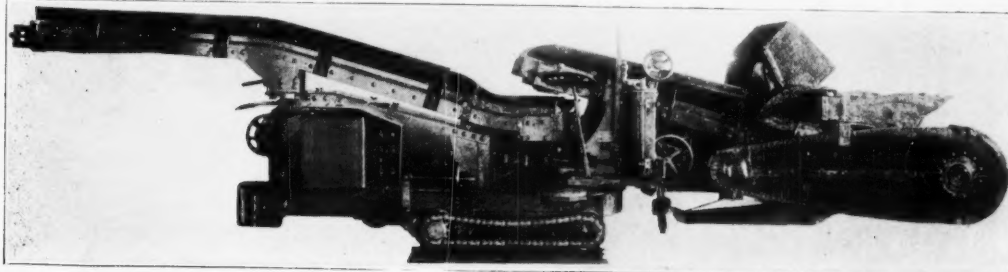
Okura & Co., for Japan and Korea.

Arthur Le Plastrier & Co., Sydney, Australia.

Victor Loughheed, 96 Ninth St., San Francisco, Calif.

Richardson, McCabe & Co., Wellington, New Zealand.

Mitsui & Co., for Manchuria and Shantung.

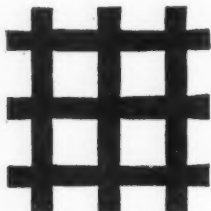


"CLEVELAND"

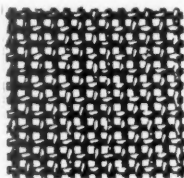
*Double
Crimped* WIRE CLOTH

A uniform fineness is assured by the use of "Cleveland" Double Crimped Wire Cloth, making it unequalled for the screening of Sand, Gravel, Crushed Stone and Cement. "Service" is the definite policy of this organization, and through every phase of manufacture this end is constantly before us.

A large stock always on hand. However, any special mesh will be manufactured to suit requirements. PRICES RIGHT.



2 1/2 mesh; .105 wire



12 Mesh; .047 Wire

**The Cleveland Wire Cloth and
Manufacturing Co.**
3573 E. 78th Street, Cleveland, Ohio

ALLIS-CHALMERS

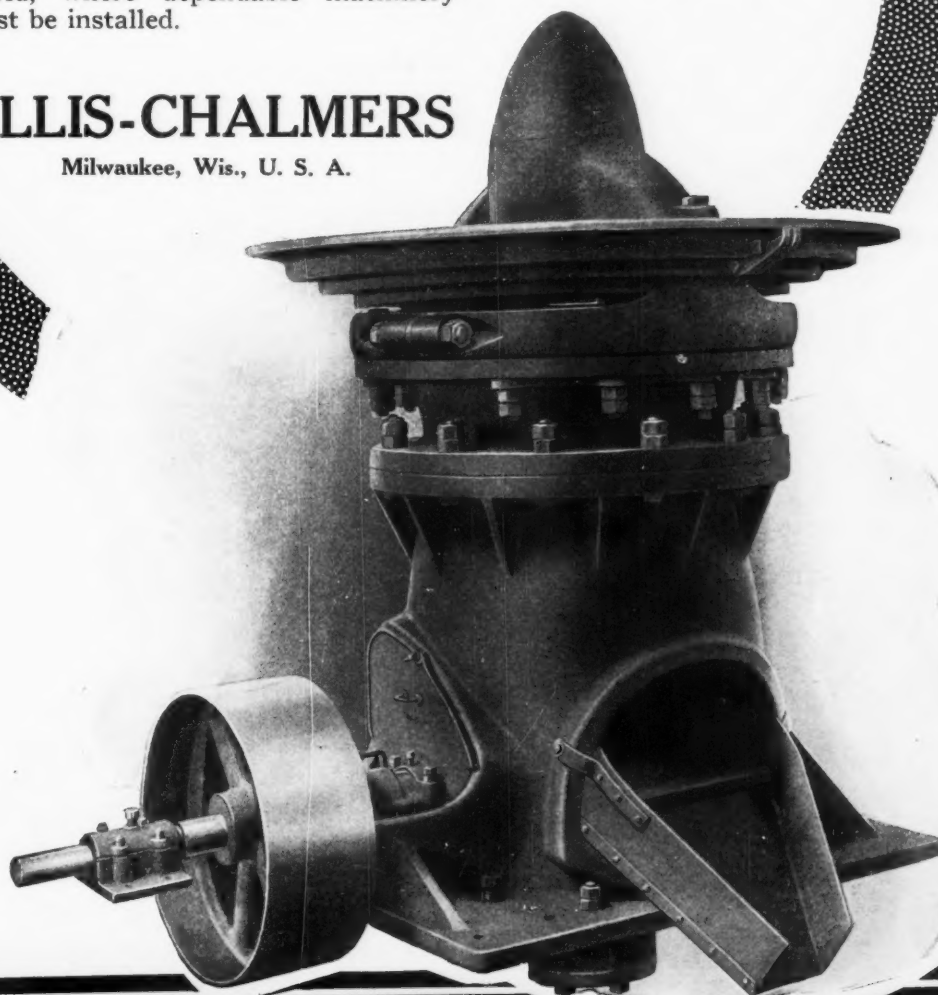
Performance—

The efficient and dependable performance of Allis-Chalmers Products in all lines of industry, even under the severest conditions of operation, is the basic cause for the increasing demand.

This, the capacity of our plant, and the service rendered by our engineering department in selecting the most suitable and efficient equipment, has made the Allis-Chalmers known throughout the world, where dependable machinery must be installed.

ALLIS-CHALMERS

Milwaukee, Wis., U. S. A.

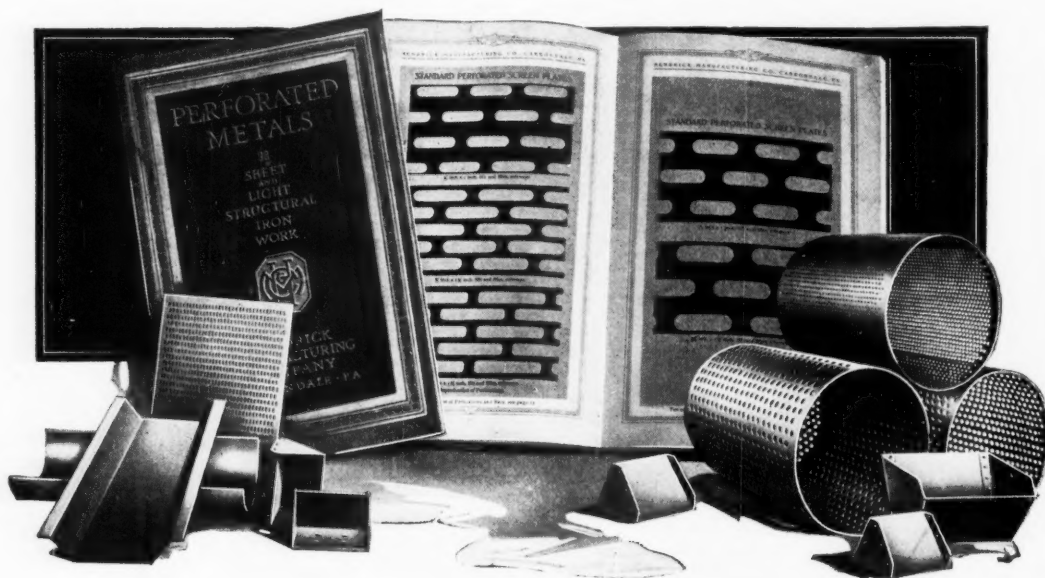


Perforated Metal Screens

for

Stone, Gravel, Rock, Etc.

Hendrick Screens are made up for your special requirements. We have the necessary equipment and careful attention is given every detail. That's the reason we've been doing business with "big" screen users for years, and our list of satisfied customers is increasing almost daily.



ELEVATOR BUCKETS

made up in any desired size. You will be pleased with our workmanship and service.

**Conveyor Flights and Trough—Stacks, Tanks, Chutes—
General Sheet and Light Structural Work**

Ask for Our Handbook

HENDRICK MFG. COMPANY

59 Dundaff Street, Carbondale, Pa.

New York Office: 30 Church St., New York City

When writing advertisers please mention ROCK PRODUCTS

YOU- 1921 and VULCAN

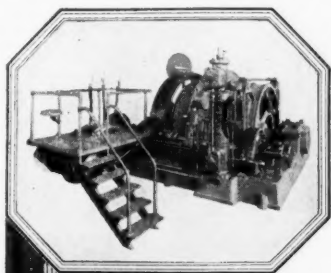
MAY the New Year clear away the problems and uncertainties of the past and enable a clearer vision of the future, that we may all work together with a full realization that there is good in all things and that it behooves us to strive to give the best that is in us.

VULCAN IRON WORKS

Established 1849

Main Street

Wilkes-Barre, Pa.

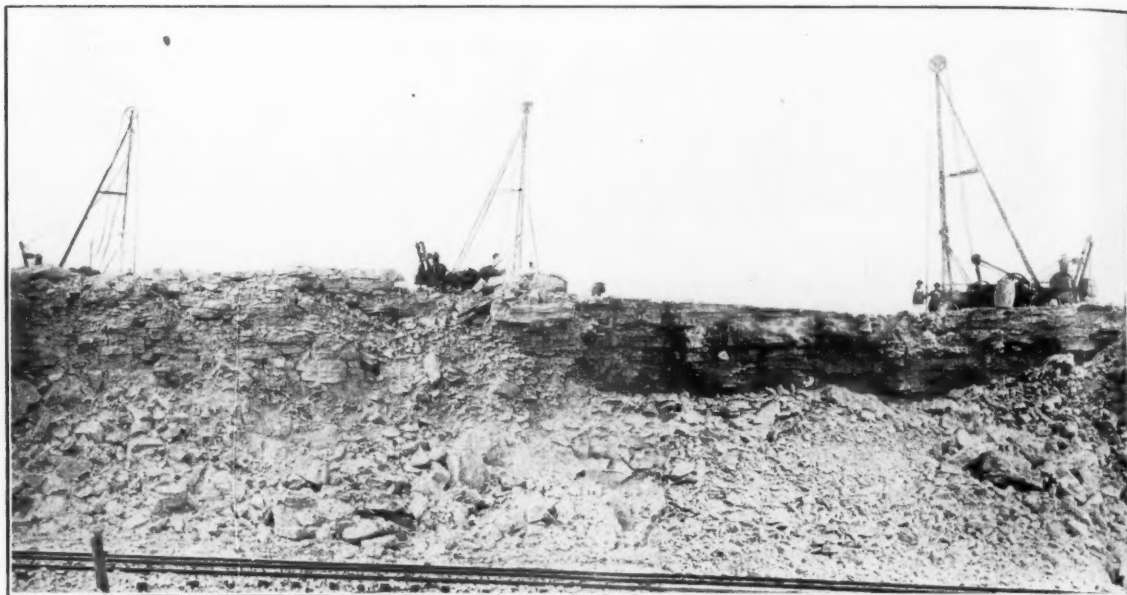


Makers of—
Locomotives
Sugar Machinery
Rotary Kilns
Coolers and Dryers
Steel Castings



When writing advertisers please mention ROCK PRODUCTS

The *Best* Blast-Hole Drill on EARTH



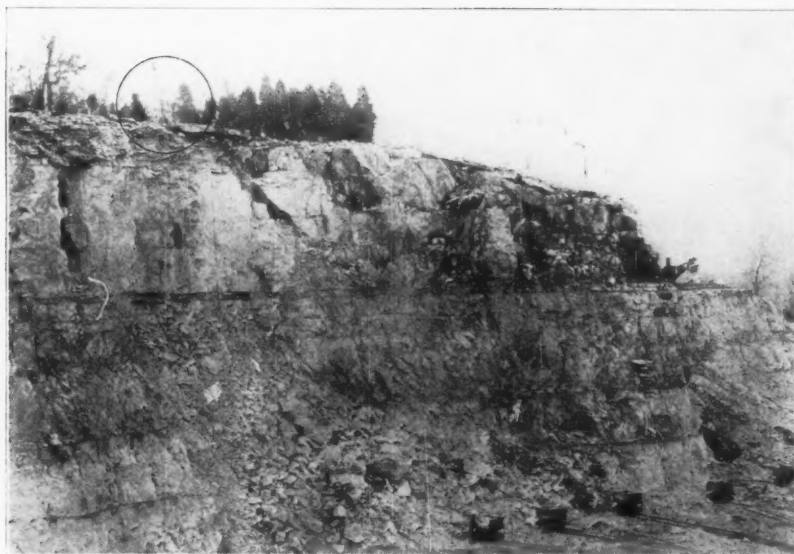
THE statement that heads these pages is not a boast or an unqualified claim, but a fact proven time after time in years past. As a pledge of our sincerity, and as a protection to those who do not have the time or inclination to dig into machine details, we back our Big Blast Hole Drill with the following unreserved and unrestricted guaranty:

We guarantee the Cyclone No. 14 Big Blast Hole Drill to drill more hole at less cost, all costs considered, and to live longer than any other big blast hole drill on the market. We will place the No. 14 Machine in your quarry in competition against any or all other makes. If the Cyclone does not out-drill and out-wear all other makes, we will remove it from the work without cost to you.

This proposition goes below the paint. It demonstrates what the machine will do—not what may be said about it. It gives you the opportunity of buying drilling equipment of clearly defined and demonstrated superiority. It puts buying on a strictly engineering basis, where it belongs.

The SANDERSON-CY ORRVILLE

The CYCLONE^{NO. 14}



Blast hole drilling is the first step in the stone production. The total investment in quarry equipment represents a hundred or more times the drill investment, but the whole production schedule is dependent on this primary operation. A shutdown in drilling ties up the entire plant and the overhead goes marching on.

The Cyclone No. 14 Big Blast Hole Drill is designed and built for continuous operation. All metal working parts are **Cast Steel**—not cast iron—and are machined with care and precision. The frame is Oregon Fir—a timber combining strength, lightness and weather resistance. Strength, endurance and speed are the keynote of its construction.

The hardest and largest users of Big Blast Hole Drills have Cyclone No. 14 Drills in their pits and quarries. And almost without exception the original sold the additional machines as they were required.

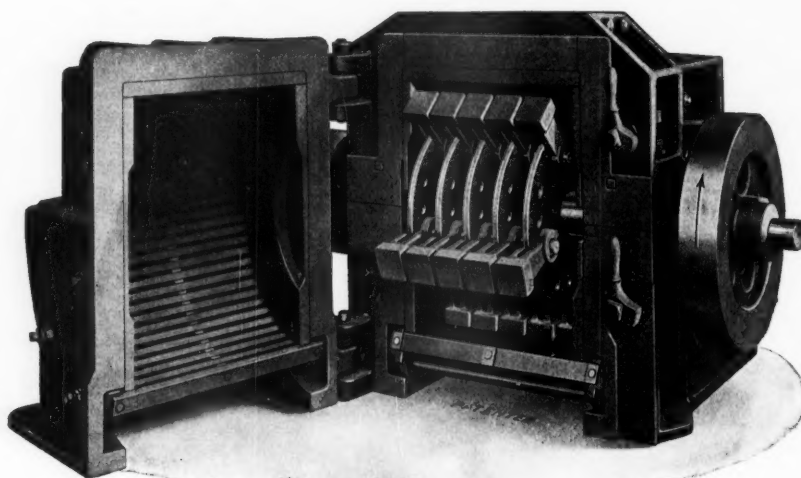
If your stone production is not right, we believe that we can help you. Write for our Big Blast Hole Data Sheet (Form 127)

CYCLONE DRILL CO

OHIO

STURTEVANT "ONE-MAN ONE-MINUTE" "OPEN-DOOR" MACHINERY

CRUSHERS, GRANULATORS, GRINDERS, PULVERIZERS,
SCREENS, MIXERS, ELEVATORS, CONVEYORS, CHUTES.



"OPEN-DOOR" SWING-SLEDGE MILL

WITH MANGANESE STEEL HAMMERS

These machines are built for the reduction of soft, moderately hard and tough or fibrous substances to any degree of fineness ranging from 1 inch to 20 mesh. For such materials as Limestone, Lime, Clay, Coal, Slate, Shale, Talc, Soapstone, Shells, Tankage, Fish Scrap, Bone, Meat, Bark, Leather, etc., or materials that require shredding, they have no equal.

"OPEN-DOOR ACCESSIBILITY"

The patented "Open-Door" feature can be found only in Sturtevant machines and is of vital importance. By simply throwing over two latches the entire front of the mill may be opened like the door of any safe, at which time the entire interior is exposed for adjustment, cleaning, or for the removal of unbreakable material, that through error may have passed to the mill, and for the removal of parts. In a mill of this kind, this is an essential.

CONSTRUCTION

Sturtevant Mills are fitted with Hyatt Roller Bearings in ball and socket mountings, thus preventing cramping of shaft and undue friction. They are lined throughout with manganese steel and are furnished with either tool-steel bar hammers for the breaking down of softer materials, such as Burnt Lime, Coal, Bone, etc., or with manganese steel Sledge Hammers when working on the harder materials such as hard or moderately hard Limestone.

The No. 1 size is also furnished with Hatchet Hammers for the reduction of scrap leather and other such materials.

STURTEVANT MILL CO., BOSTON MASS.

When writing advertisers please mention ROCK PRODUCTS

OSGOOD

Large or Small—You can't make a better shovel investment

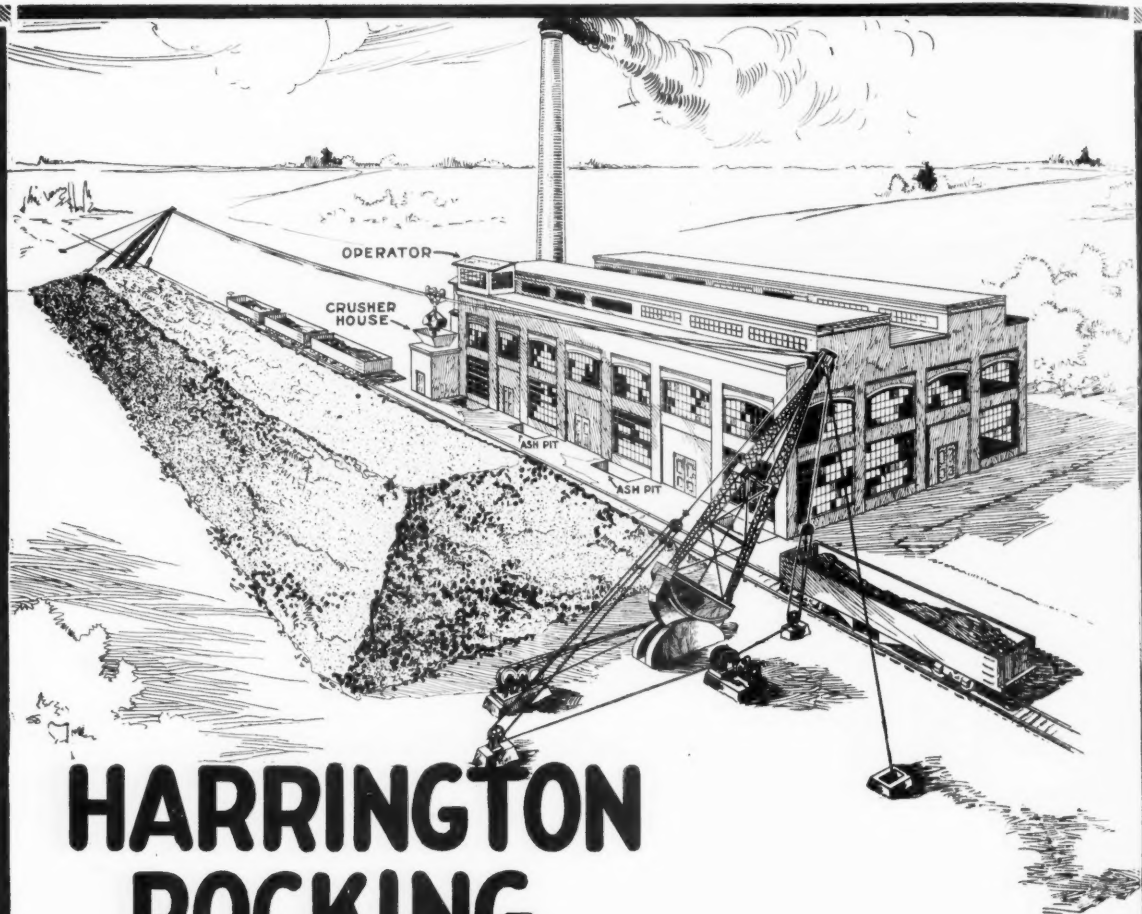
Whether it is to meet the requirements of quarry work where the largest crushers are used, for handling ores where large capacity is required, for excavating shale, etc., without blasting, or for the general everyday use in construction work, you buy the greatest amount of satisfaction in every way when you buy an OSGOOD—Large or Small. We willingly help you solve your excavating problems in a way that will materially reduce yardage cost.

Write today for copy of our General Catalog C-1

Revolving and Railroad Types, $\frac{3}{4}$ to 6 cu. yds.



THE OSGOOD CO., MARION, OHIO



HARRINGTON ROCKING CABLEWAY

is unequaled for rapid handling of bulk materials, castings, lumber, structural steel, etc., stored in piles.

Combines crane service with cable-way speed, regardless of conformation of ground. Gives both longitudinal as well as lateral conveyance.

Reclaims all its piles without the use of retaining walls. Yard is free from constructions and trestles. Can be operated by either steam or electricity and handled easily and quickly by one man.

The most efficient, dependable, economical means known for handling materials in selective piles.

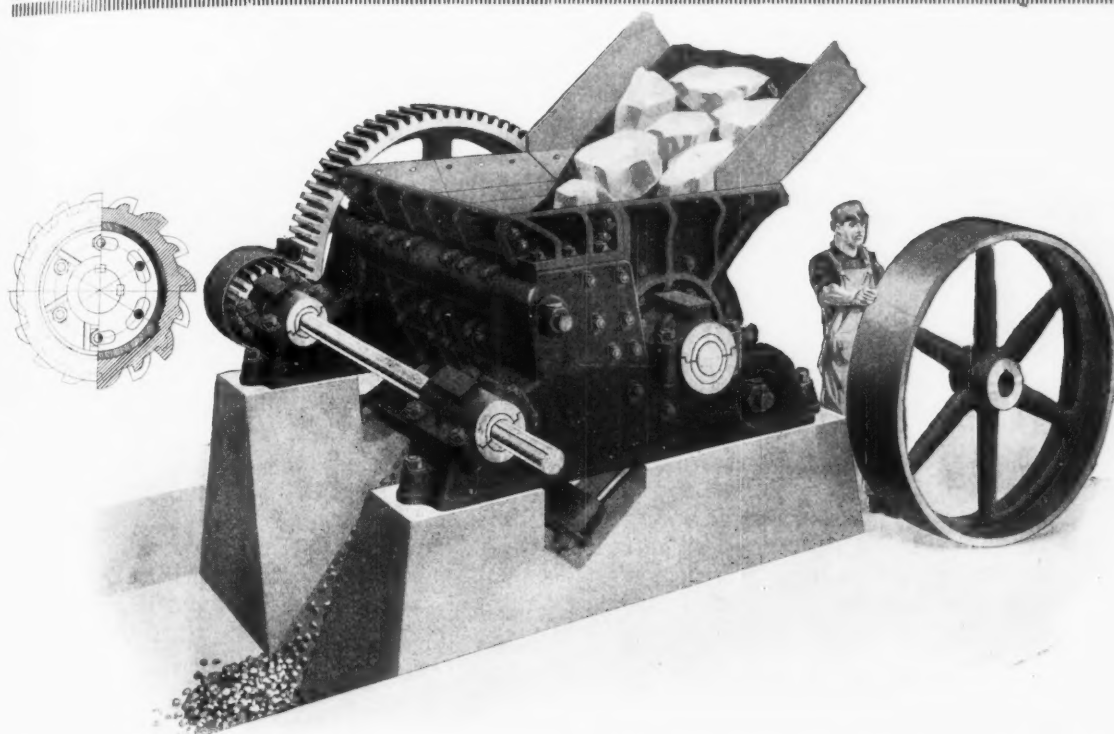
Write us for full particulars

HARRINGTON



ROCKING CABLEWAY

RAILWAY AND INDUSTRIAL ENGINEERING CO., GREENSBURG, PA.



Stevenson ^{New} Type Crusher

This is a Single Roll Swinging Plate Crusher—our Model A-339—and while it is new in design, and an innovation in the crushing industry, it is old enough to have proven its efficiency, value and worth.

All wearing parts of this machine are made of the very hardest and toughest materials—manganese and other heat-treated steels. The teeth on the roll are transferable, thereby keeping up the efficiency and reducing the upkeep costs, and roll disks can be assembled to accommodate material being

crushed, staggering the teeth or placing them all in a straight line. The breaking plate is provided with liners, half and quarter soles, of manganese or other heat-treated steels, and these can be changed on the breaking plate, thereby getting three different wearings from the same piece of metal. The bearings are big and strong, amply providing for any emergency. The gear teeth are short stub type of immense strength.

Stevenson Roll Crushers are self-feeding.



Write for catalog and complete information

The Stevenson Company

General Offices and Works—Wellsville, Ohio

Engineering and Western Sales Offices—Monadnock Building, Chicago, Illinois

When writing advertisers please mention ROCK PRODUCTS

BUCYRUS

THIS is the time to make your decision regarding improvements and replacements. Go over your excavating equipment carefully and see what should be replaced or where additional equipment—labor-saving devices—should be installed in order to increase your output economically and meet the severe competition that is sure to come with the opening of the season.

Bucyrus shovels that are especially designed for quarry work, have a range in size from the 14-B 2/3-yd. machine to the 110-C. R. R. type with a 6-yd. dipper. Whether your pit is wet or dry, large or small, there is a Bucyrus dragline excavator to suit your requirements. The sturdy B 1-yd. revolving shovel illustrated below can be readily converted into a clam shell excavator, a crane, a dragline excavator or a sewer shovel. There are few conditions under which it cannot be employed efficiently, and it may be converted from one type to the other in the field.

Its efficiency as a dragline excavator in the sand and gravel pit is beyond all question. There are no tracks to lay, no wear and tear on cars and locomotives, no pumping and no fear of floods.

Bucyrus dragline excavators built in all sizes, with boom from 40 to 155 ft.

Send for Bulletin G. P.

No. 310

Bucyrus Company

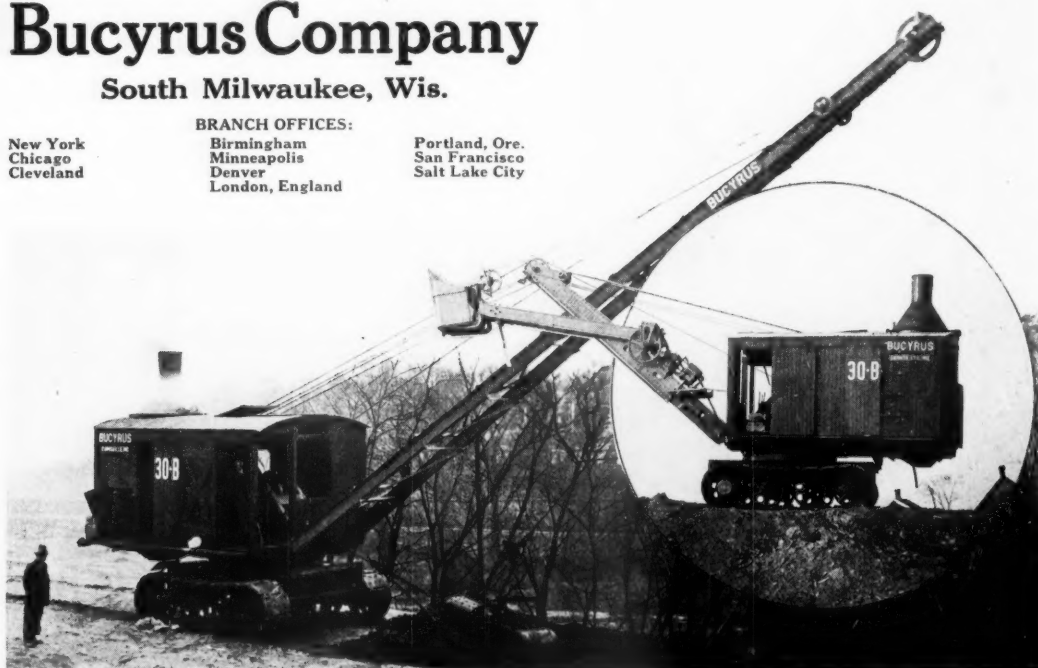
South Milwaukee, Wis.

New York
Chicago
Cleveland

BRANCH OFFICES:

Birmingham
Minneapolis
Denver
London, England

Portland, Ore.
San Francisco
Salt Lake City

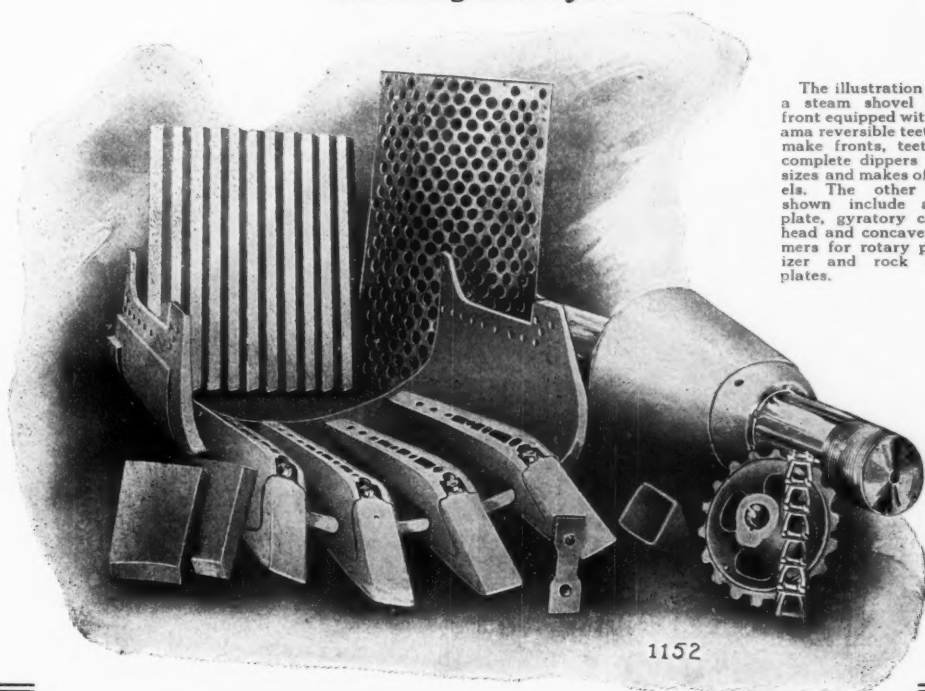


Tisco Manganese Steel

Castings and Wearing Parts in

**Jaw and Gyratory Crushers, Steam Shovel Dippers, Racks,
Pinions, Gears, Dipper Teeth, Hammer Mills,
Ball Mills, Tube Mills, Kominuters**

*Tisco Manganese Steel Chain and Sprockets for Elevators
and Drag Conveyors*



The illustration shows a steam shovel dipper front equipped with Panama reversible teeth. We make fronts, teeth and complete dippers for all sizes and makes of shovels. The other parts shown include a jaw plate, gyratory crusher head and concave, hammers for rotary pulverizer and rock screen plates.

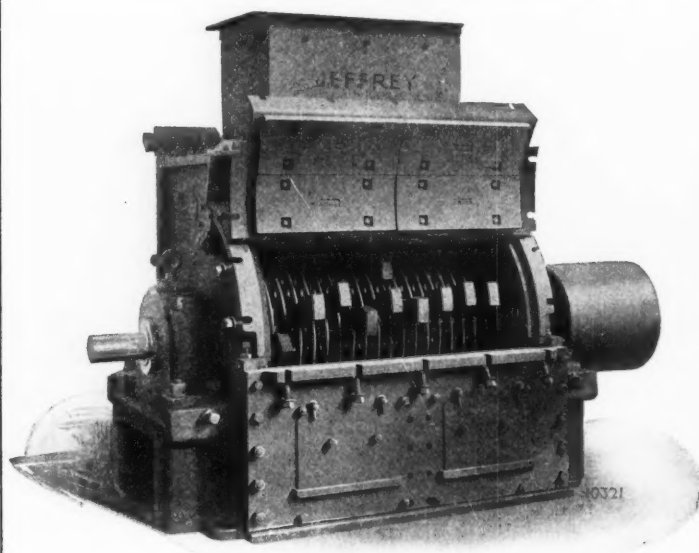
Actual service is the test that proves TISCO Manganese Steel wearing parts absolutely dependable where great strength, toughness and resistance to wear are required. Tisco Manganese Steel made trap and granite rock crushing commercially possible. It has given from four to six times the length of service of chilled iron.

Gyratory crusher mantles can be made smooth or corrugated and of any design required. Tisco Manganese Steel screen plates wear many times longer than punched plates, give a more uniform product and do not clog because the holes are tapered. All repair parts are either carried in stock or can be shipped very promptly.

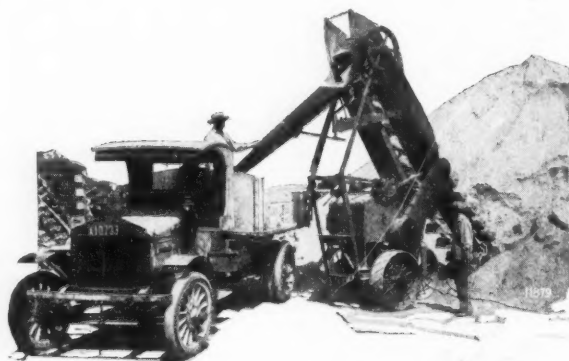
Get Our Exchange Proposition on Dipper Teeth

Taylor-Wharton Iron & Steel Co., High Bridge, New Jersey

When writing advertisers please mention ROCK PRODUCTS



Type "B" Ball Bearing Swing Hammer Pulverizer, for Breakdown of Large Pieces of Limestone, Gypsum, Shale, etc.



Radial Type Loader, for Handling Sand, Gravel, Crushed Stone, Coal, etc. Type "G" Loader has a capacity of $1\frac{1}{2}$ to 2 cubic yards per minute. Type "K"—1 cubic yard per minute.



Another "Good Roads" Limestone Crushing outfit showing Jeffrey Elevator from beneath large gyratory crusher to revolving screen over bins

Jeffrey

CRUSHING ELEVATING *and* CONVEYING MACHINERY

*Will Fit Right
Into Your Plans
for 1921*

Producers of Cement, Lime, Crushed Stone, Sand and Gravel, Phosphate, Gypsum, Talc and Soapstone, Glass Sand, Oil Shale, and other materials can meet their handling and crushing requirements with some of our standard types of Bucket, Pan, Belt, Steel Apron, Chain, Scraper or other types of Conveyors; Portable Bucket Loaders; Bucket Elevators; Crushers; Pulverizers; Electric Trolley and Storage Battery Industrial Locomotives, etc.

Write for latest catalogs and price lists

The Jeffrey Mfg. Company

935 North Fourth Street Columbus, Ohio

BRANCH OFFICES:

New York
Boston
Scranton
Buffalo

Philadelphia
Cleveland
Pittsburgh
Chicago
St. Louis
Dallas
Milwaukee
Los Angeles
Charleston, W. Va.

Denver
Montreal
Detroit

When writing advertisers please mention ROCK PRODUCTS

Type "A" ERIE Shovel



"Our best investment"



"ANYONE contemplating the purchase of a steam shovel is welcome to call at our quarry and see our two Type 'A' ERIES in operation. These 13-ton shovels load 40 cu. yds. of stone each per hour, and have an easy time of it.

"In a bank 7 ft. deep on our quarry, we did more stripping with one 'A' ERIE in five days than we accomplished in six weeks with 8 men and 4 carts.

"We can safely say that our 'A' ERIE Shovels are the best investment we have ever made."

—Letter signed by A. Vandermade, Proprietor, SOWERBUTT QUARRIES, Paterson, N. J.

Such letters as the above show that the 'A' ERIE gives excellent service in light quarry work.

Here is a real steam shovel—strongly built and very reliable, yet weighing only 13 tons in working trim! Easily and rapidly moved.

Let us send you a full description of this machine. Write for Bulletin P-22.

BALL ENGINE CO., Erie, Pa., U. S. A.

Builders of ERIE Steam Shovels and Locomotive Cranes

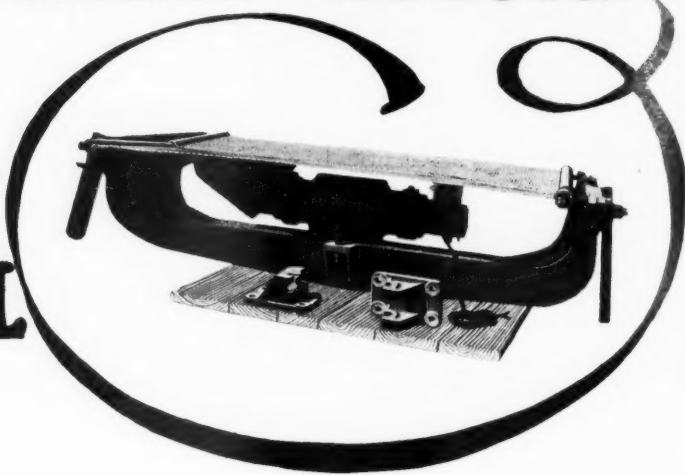
ERIE

Revolving Shovels

BALL
Engine Co.
Erie, Pa.

"It has taken the place of two conical screens"

MITCHELL ELECTRIC VIBRATING SCREEN



Facts like the one presented in the following letter are interesting to **every one** who has a screening problem.

For they show the fundamental superiority of the Mitchell—a superiority that may be depended upon to manifest itself with any material and under any operating conditions.

"We are glad to inform you that the one No. 2 Mitchell Electric Vibrating Screen we have installed has proven very satisfactory. It has taken the place of two conical screens and the screen efficiency is about 15 per cent higher than the two rotary screens.

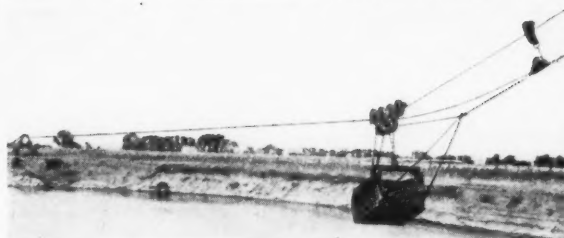
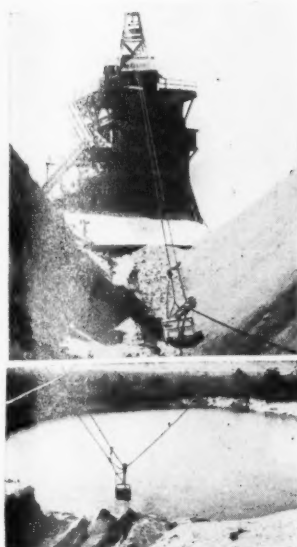
"The sand and gravel going to the screen contains considerable water. The feed to screen is minus $\frac{3}{4}$ -in. and about 70 per cent of this material passes through a 4-mesh screen with a 170-in. opening.

This vibrating screen has been in operation for about six months, and the vibrator has run constantly during working hours. Our one screen has proven so satisfactory that we have purchased two more screens and will install these this winter."

Write us for data on the success of the Mitchell with screening problems similar to yours.

Stimpson Equipment Company
315 Felt Building Salt Lake City, Utah

When writing advertisers please mention ROCK PRODUCTS



What System of Excavating and Conveying Gets the Gravel From the Pit to the Plant at the Lowest Cost Per Ton?

Convincing proof is at hand that a Sauerman Dragline Cableway Excavator can dig and deliver to the hopper of a screening plant a definite tonnage of sand and gravel at a lower per ton cost than is possible by the use of any other equipment or combination of equipment.

The cost figures that furnish the basis of the above statement have been contributed by leading gravel producers who have operated Sauerman Dragline Cableway Excavators for a period of years, and some of these producers employ several of our equipments at different locations with consequent variations in conditions and requirements.

The commercial operator who can handle his material at lowest cost per ton has the advantage in the competition for business, and that is one of the big reasons why the Sauerman Dragline Cableway Excavator must be given first consideration in connection with any plans for a new gravel plant or for improvement of an existing plant.

Our leadership in designing and manufacturing dragline cableway excavators is backed up by a staff of engineers with years of experience in laying out and installing this type of equipment to best meet the individual requirements of each proposition. Let us know the details of your problem and we will submit our suggestions.

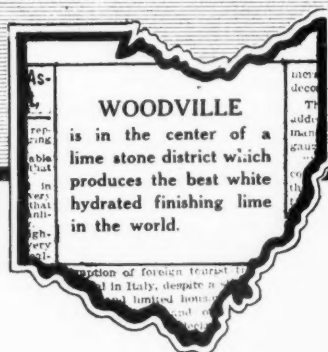
SAUERMAN BROS.
1140 Monadnock Block Chicago

IMPORTANT In addition to their ability to handle material at the lowest cost per ton, Sauerman Dragline Cableway Excavators are notable for their adaptability to almost any ground conditions. The illustrations on this page give a partial idea of how Sauerman equipment is meeting the needs of both large and small producers, excavating sand and gravel from banks and dry pits, from rivers, creeks and ponds. If you are interested in further proof of the adaptability of Sauerman Cableways to all types of gravel operations, write for our Catalog No. 7.

When writing advertisers please mention ROCK PRODUCTS

ARNOLD & WEIGEL

CONTRACTORS *and* ENGINEERS



*Specializing in the design of
modern Lime Calcining and
Hydrating Plants*

Builders of the
"Arnold" Lining
for Vertical Lime
Kilns

Write for our booklet

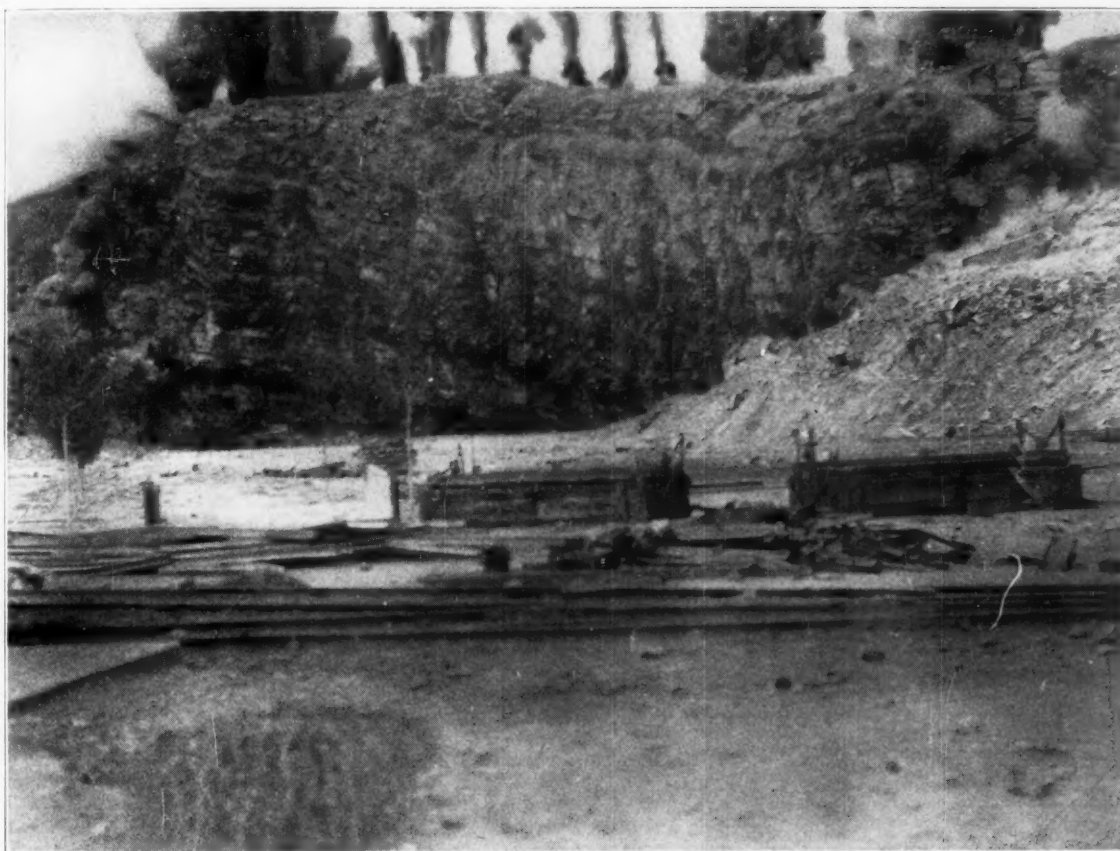
"THE ARNOLD LINING
FOR LIME KILNS"

WOODVILLE, OHIO

CORDEAU-BICKFORD Detonating Fuse

A detonator that makes the operating of a quarry more safe and also decreases blasting costs should interest quarry operators. Cordeau is particularly adapted to well drill blasting and the tunnel and pocket method of blasting where large quantities of explosive are to be detonated.

Cordeau is run from the top to the bottom of the drill hole in continuous contact with the explosive charge. **Results:** Complete detonation, quicker detonation, greater shattering effect, lower secondary costs.



The Ensign-Bickford Co., Simsbury, Conn.

Established 1836

Original Makers of Safety Fuse

When writing advertisers please mention ROCK PRODUCTS

BALDWIN

A Well-Filled Store Room Means Efficient Motive Power

DO not wait until one of your locomotives is laid up for repairs before stocking up your store room. With the present freight congestion, delays in the delivery of repair parts may keep a locomotive out of service for weeks and cause heavy loss to the owner.

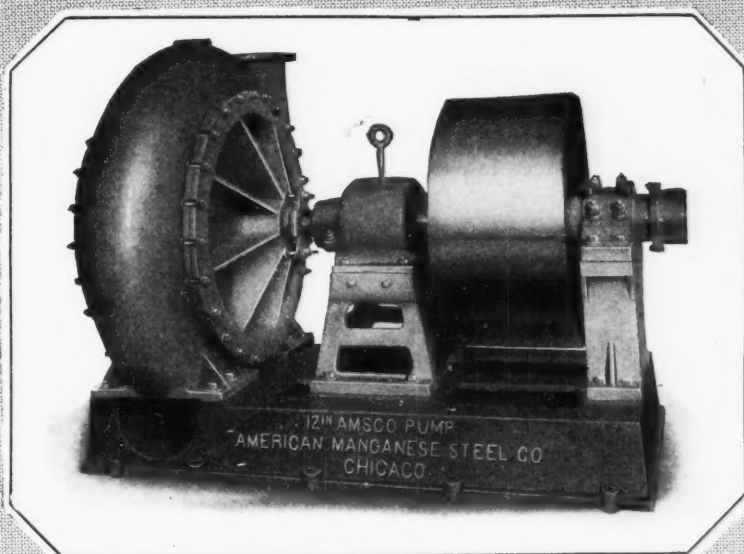
We are well equipped to furnish promptly all duplicate and repair parts, whether for Baldwin locomotives or for those built by other companies provided we are supplied with the necessary information.

All Baldwin Locomotives are built to gauges and templates, providing for like parts fitting accurately in all engines of duplicate design, thus reducing to a minimum the cost of making repairs.

THE BALDWIN LOCOMOTIVE WORKS
PHILADELPHIA

LOCOMOTIVES

When writing advertisers please mention ROCK PRODUCTS



AMSCO

Sand & Gravel Pumps

The Shell, Sideplates and Runner, parts exposed to abrasive wear and impact shock, are made of Manganese Steel. The extra heavy shaft, large sturdy bearings, ball bearing thrust collar and well balanced runner, make the AMSCO pump a smooth operating and dependable producer. Low upkeep with maximum output makes satisfied users.



AMERICAN MANGANESE STEEL CO.

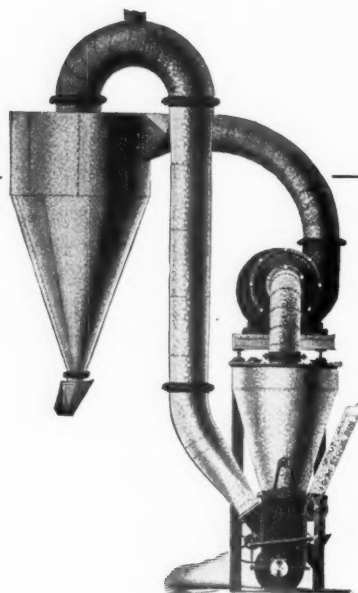
General Offices: 1872 McCormick Building, Chicago

Eastern Sales Office: Hudson Term. Bldg., N. Y.

Western Sales Office: Newhouse Bldg., Salt Lake City

Pacific Coast Office: Insurance Exchange Bldg., San Francisco, California

Foundries: Chicago Heights, Ill.—New Castle, Delaware—Oakland, California



Next Spring Will See the Demand for Hydrated Lime Enormously Increased With the Renewal of Building Activity

Now Is the Time to Begin Thinking of Overhauling Old Plants, Installing New Equipment and Increasing Plant Capacities

A good many of our customers, both new and old, who manufacture hydrated lime realize the enormous demand which is bound to come with renewal of favorable building conditions and are at the present either considering new equipment or have already placed their orders.

Raymond Air Separating Equipment, because of its large capacity with low power consumption and low cost of repairs, has firmly entrenched itself

in the lime industry, becoming known as a standard in many plants.

It not only air separates the hydrate into a smooth finished product but also eliminates the impurities like core, sand, and unburnt lime without loss of good hydrate such as occurs with screens.

An investigation will convince you, and remember, now is the time to consider changes in your plant in order to insure delivery and installation before the Spring demand begins.

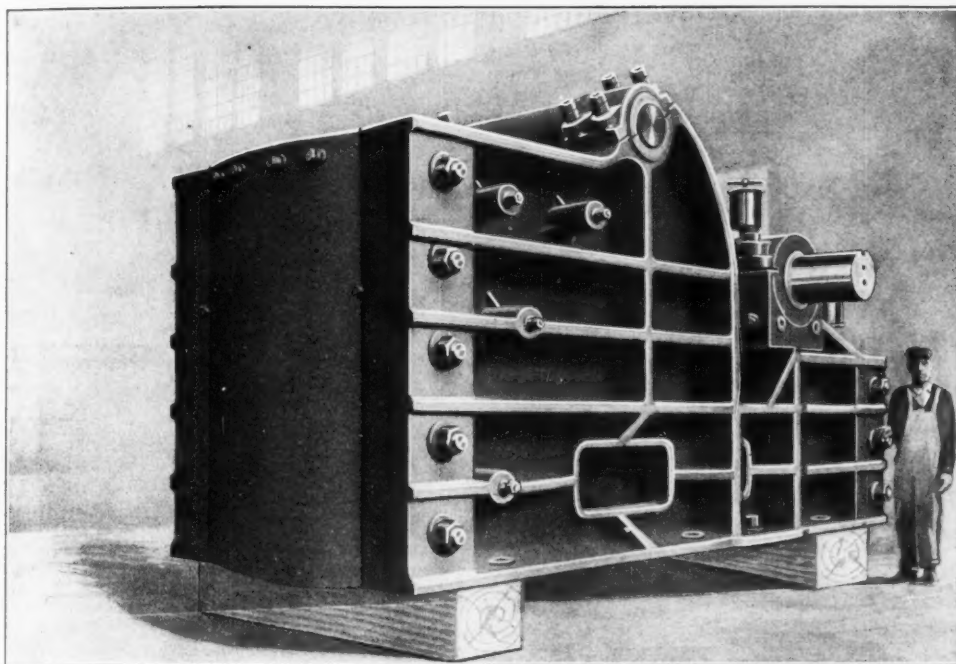
RAYMOND BROS. IMPACT PULVERIZER CO.
1301 North Branch Street **Chicago, Ill.**

Western Office: 201 Boston Bldg., Denver, Colo.
Eastern Office: 5th Floor, Grand Central Palace, New York City

When writing advertisers please mention ROCK PRODUCTS

When YOU Think of Buchanan—Think of Crushers

TEXAS TRAP ROCK *and*



BUCHANAN *JAW* CRUSHERS

ALL STEEL *PATENTED*

When the two get together new Texas crushing records are made. The installation of a 40x42-in. Buchanan all steel Jaw Crusher at the Knippa, Texas, plant of the Texas Trap Rock Co. is another notable example of the dependability and efficiency of these crushers. Feeds directly to a 30-in. belt conveyor.

The quarry is a large face of extremely hard and tough trap rock that calls for a

massive, rugged crusher, and after a survey of the field a Buchanan was selected largely because of its all steel construction and known ability to do the hardest kind of work at low cost.

Let us help you arrive at the best size and type of Buchanan Crusher for your work—24 sizes, from 66-in. by 84-in. to 24-in. by 36-in.

We will send catalogs. Write us

C. G. BUCHANAN CO., Inc.

90 West Street

New York

Crushing Machinery, Crushing Rolls and Magnetic Separators

When YOU Think of Crushers—Think of Buchanan



You can't crack a nut on a pillow!

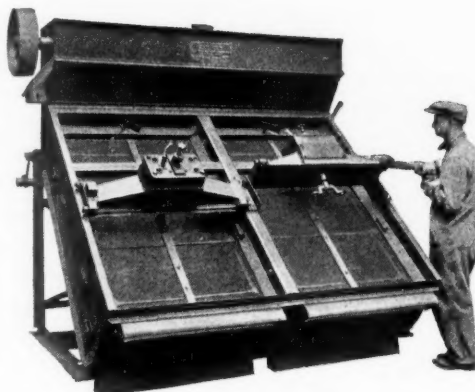
NOR can you get the largest tonnage from a crusher when it retains a large percentage of fine material which acts as a cushion.

It is a well-known fact that fines, when they are produced and retained in the crusher, interfere with the crushing action of the coarser particles because they act as a cushion to the material being crushed.

It is also a well-known fact that the coarser particles grinding against each other assist the pulverizing action.

With the HUM-MER "electrically" vibrated screen you can remove the fines from your crushers as fast as they are produced, you can feed the grinder to the limit of its capacity and the fines will be removed by the HUM-MER.

In one installation, working in closed circuit with Harding Mills on cement, by increasing the feed to the mill and screening the fines with the HUM-MER, the output of a given size material was more than doubled, and this with the same horse-power.



HUM-MER

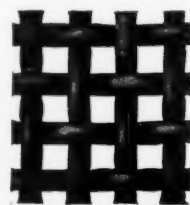
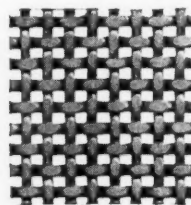
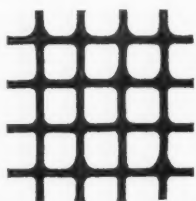
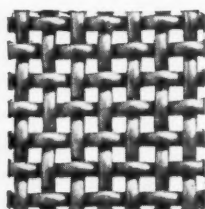
Electro-Magnetic

SCREENING PROCESS

Send for catalogue No. 42-R

THE W. S. TYLER COMPANY, Cleveland, Ohio

Manufacturers of woven wire screens and screening equipment



When writing advertisers please mention ROCK PRODUCTS



A detailed description of the many superiorities of construction and design, of the thoughtful care in producing the American Gasoline Locomotive, is obviously impossible in this limited space.

The fact that we are building for the future, and this principle has insisted on the best locomotive of its class irrespective of price, is amply proven by the husky ruggedness of the American that enables it to stand the abuse of every day usage, even in the hands of an incompetent.

This locomotive is distinctly a "step-ahead" product. It is simple in design, engineeringly correct, economical and reliable in operation, and is quick in action. No tinkering or repairs on the American — it is "Built Right to Run Right." The American is Friction drive, Hercules motor. Efficient cooling system. Telescopic coupling in transmission housing. Self-aligning Axle. Direct full vision ahead. Drive chains run in oil. Positive 4-wheel sander and 4-wheel brakes. Part accessible.

Built in several sizes, types and horsepower.

Send for catalog containing details and full description.

Our Mine and Quarry Special Is Built for You

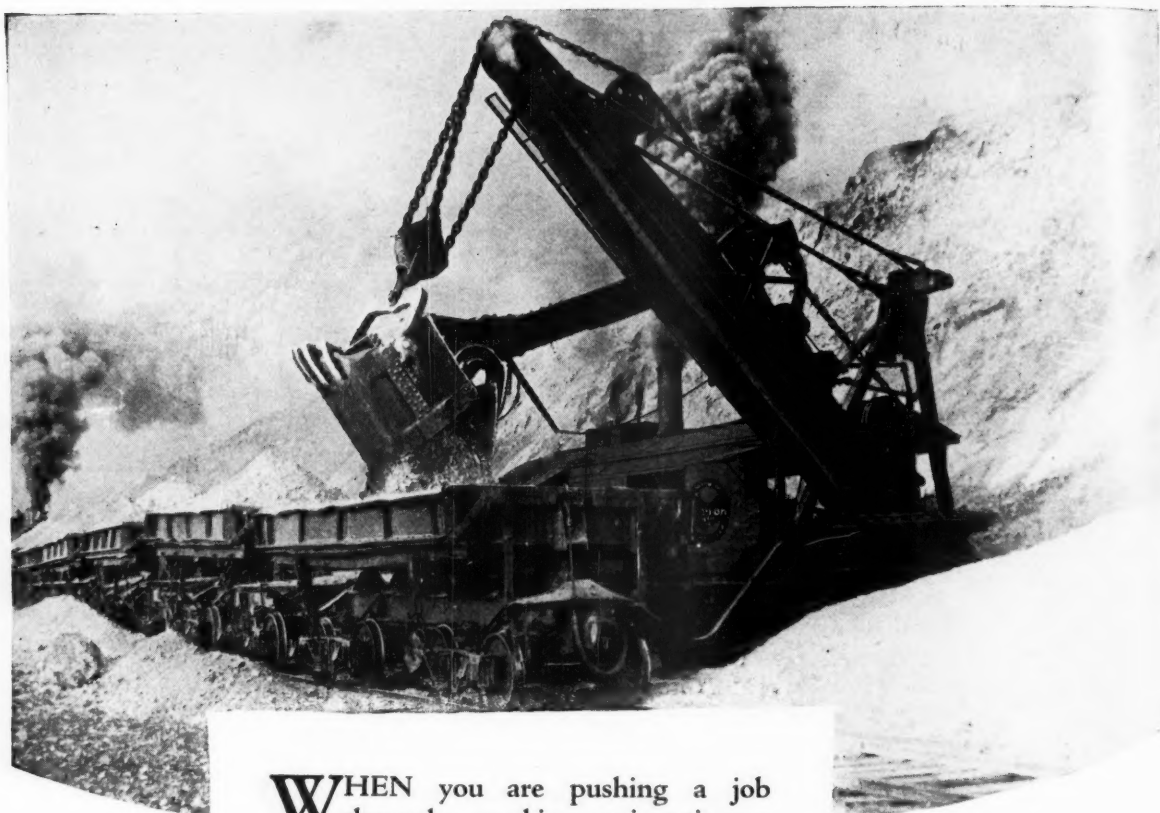
The Hadfield-Penfield Steel Company

BUCYRUS, OHIO

General Sales Office 404 Hippodrome Bldg., Cleveland, Ohio, Geo. A. Stein, Sales Manager



When writing advertisers please mention ROCK PRODUCTS



WHEN you are pushing a job through—working against time—you want *action*. Maximum capacity must be maintained or the loading schedule will lag. It's then that the "Marion" service drives home the true meaning of "Marion" *quality and dependability*.

The continuous handling of heavy stone, either from the stock pile or quarry; the steady day-after-day grind when demand is the heaviest; the special drives for extra tonnage—all lay a severe burden on the loading equipment.

Marion Railway Type Shovels are designed for just such service. Their rugged construction and speed of operation insure steady performance and satisfactory service.

THE Marion
STEAM SHOVEL CO.

Established 1884

Marion, Ohio

New York Chicago Atlanta San Francisco

Boise, Idaho, - Clyde Equipment Co.
Billings, Mont., - F. B. Connelly Co.
Dallas, - F. B. Wright, Bush Bldg.
Denver, - - - H. W. Moore & Co.
Detroit, W. H. Anderson T. & S. Co.
Vancouver, - - - - -
Montreal, - - - - -

Philadelphia, H. L. Cox, 13 & Cherry
Pittsburgh, - - - J. W. Patterson
Portland, - - - Clyde Equipment Co.
Salt Lake City, H. W. Moore & Co.
Seattle, - - - Clyde Equipment Co.
Vancouver Machinery Depot, Ltd.
H. J. Hopkins & Co., Ltd.



When writing advertisers please mention **ROCK PRODUCTS**

Father Time's Advice



Every year—since the Civil War—MORRIS PUMPS have successfully demonstrated their usefulness and economy in handling pumping problems.

THEY WILL SERVE YOU EQUALLY AS WELL IN 1921

There is a MORRIS PUMP for every pumping purpose.

Our booklet tells you many vital facts about pumping. Write for a copy.

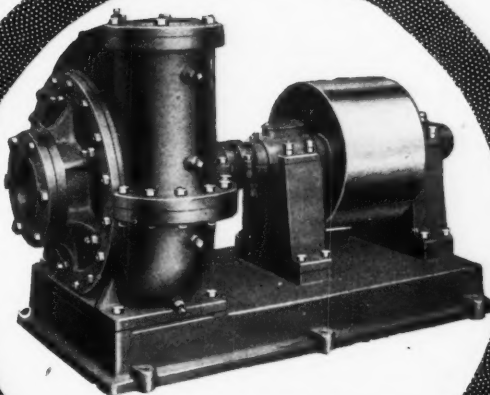
Morris Machine Works Baldwinsville, N. Y.

New York, 39-41 Cortlandt St.; Philadelphia, Real Estate Trust Bldg.; and Charlotte, N. C., Realty Bldg.

Representatives in Principal Cities



Hydraulic suction dredging is the most economical method of handling sand and gravel because the material is raised and delivered in one operation. Morris Pumps have made records for capacity and service in this work.



Since 1864 Builders of Centrifugal Pumps,
Hydraulic Dredges,
Steam Engines

A good resolution for the New Year will be to always investigate the advantages of Morris Pumps before making a pump installation. Let Morris Pumps solve your 1921 pumping problems—they will be solved right for many years to come.

MORRIS PUMPS

When writing advertisers please mention ROCK PRODUCTS

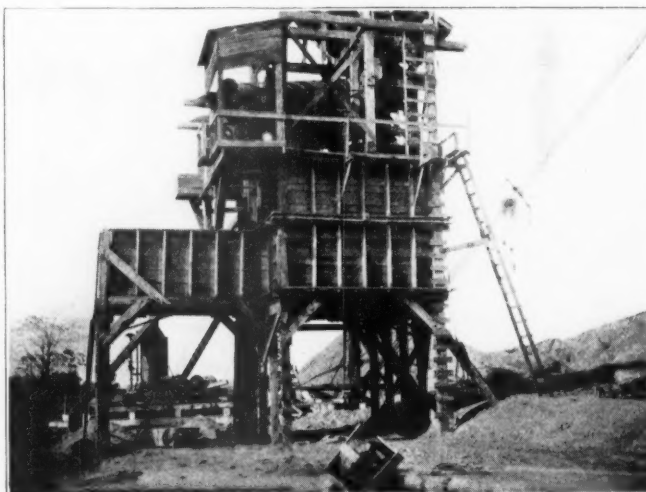
GOOD ROADS

Stone, Sand and Gravel Plants

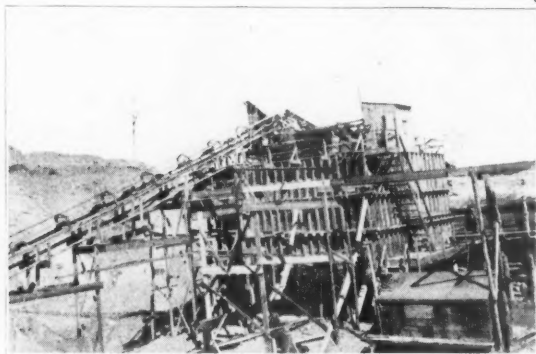
furnish the largest measure of satisfaction and profit to users. Here are the reasons: The designs are well suited for each particular case; the machinery is constructed of the best materials; each installation gives exactly the results desired.

We design, build and superintend the installation—whether it be large or small.

We stand back of every piece of equipment we send out and furnish that which is necessary to your success and ours—the best **SERVICE** of which we are capable.



Gravel Plant. Designed, built and installed for Geo. Newhall Co., Cleveland, O.



Sand Plant. Designed, built and erected for Groves & Son, Minneapolis, Minn.

A Partial List of Our Products

Rock Crushers
Elevators
Revolving Screens
Shaker Screens
Sand Separators
Cable Buckets
Conveyors
All kinds of
Quarry Machinery

Let us figure with you on new equipment or any additions you may need to your present plant. *Write Today for Catalogue*

THE GOOD ROADS MACHINERY CO., Inc.

The Bulletin Building, Philadelphia, Pa.

1203 Tower Building, Chicago, Ill.

The BRADLEY HERCULES MILL

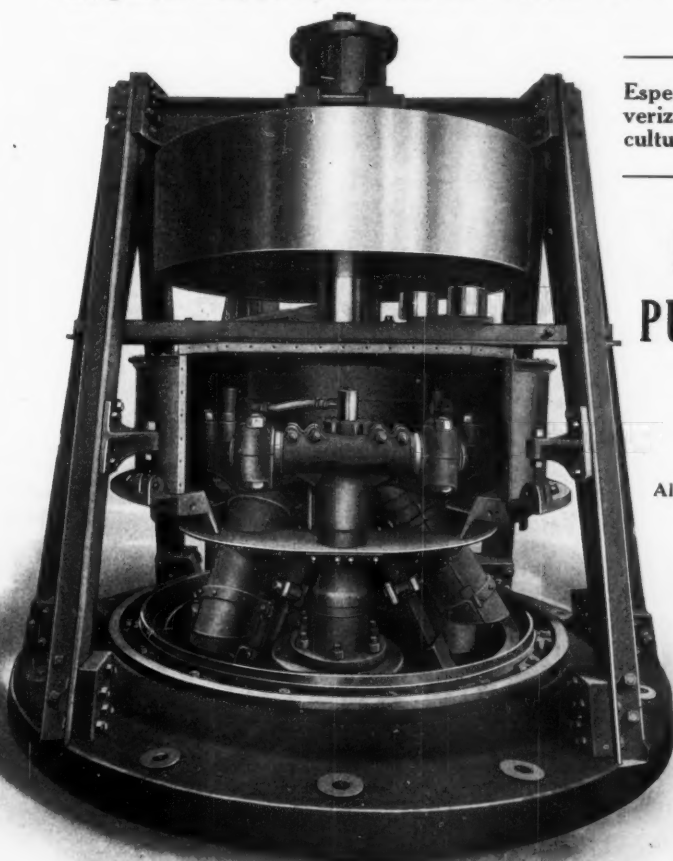
More Popular Than Ever

Since 1913 the Bradley Hercules Mill for the preliminary pulverizing of cement materials has been in operation at the largest and most successful cement plants in the country.

It is a wonderful labor and power saver—the largest preliminary machine manufactured, adapted for cement rock, limestone or clinker, and its efficiency is proven by the fact that—

One manufacturer with two mills ground 170,000 barrels clinker in one month. Another manufacturer has averaged 40 tons per hour, when grinding limestone, over a period of several years of operation.

Our Engineers will gladly show you how this mill will reduce your present operating costs, using your present tube mill equipment, and increase your output.



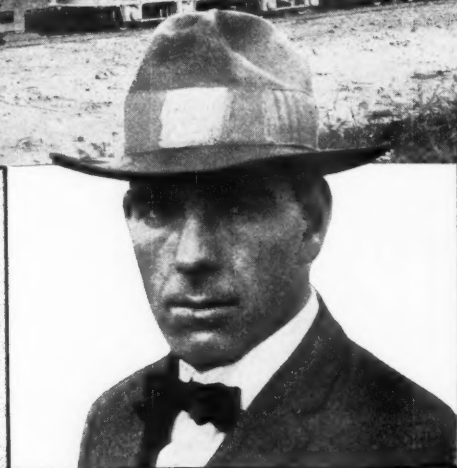
Especially adapted for pulverizing limestone for agricultural purposes.

**BRADLEY
PULVERIZER
CO.
BOSTON**

Works:
Allentown, Pa. London

*Manufacturers of
Pulverizing Machinery
for 30 Years.*

When writing advertisers please mention ROCK PRODUCTS



W. D. DEAN, SUPT. ILLINOIS ROAD PAVING CO.

Pluckiest Industrial Locomotive Built

W. D. Dean, Superintendent for the Illinois Road Paving Co., used one 3-ton and one 6-ton PLYMOUTH Locomotive in the construction of the Roosevelt Highway from Wheaton, Illinois, extension west, cement construction 18 feet in width.

Mr. Dean is a Plymouth enthusiast, and says they are the pluckiest industrial locomotive built. The 6-ton Plymouth, in serv-

ing the mixer, negotiated a 5.85 percent grade with 8 cars loaded with 16 batch boxes each containing a yard apportionment.

We like to get a worthy Plymouth boost out on the job, and from a superintendent with his feet on the grade—he knows, and there isn't any quiver in his voice when he speaks.

Ask us for Plymouth literature.

The Fate-Root-Heath Company

Plymouth, Ohio

PLYMOUTH
Gasoline Locomotives

Rock Products

Vol. XXIV

Chicago, January 1, 1921

No. 1



Dear Reader: It is up to you to see that your Uncle Samuel gets busy on this job and that soon!

291927

Further Price Reductions Depend On Production Economies

Wages in 1921 May Be 10 to 25 Per Cent Less Than 1920; Coal Should Cost Less, But Uncertainty of Railway Service and the Possibility of Limited Production Will Tend to Keep Prices Up

PRACTICALLY EVERY PRODUCER in the rock products industry apparently has an optimistic view of the business conditions to develop this new year of 1921.

Through the kind co-operation of several hundred of our friends and readers the editor has collected many analyses of 1920 conditions and nearly as many forecasts of 1921—and optimism is the prevailing note, notwithstanding the severe jolts all of these producers received in the year just passed.

Of 279 presidents, managers and secretaries of building material producing companies, who ventured prophecies, 204 are confident 1921 will be a *good* year. Many of them think it will be the best year ever. Of these 30 think that work will be slow developing in the spring, but that by mid-summer a full-fledged building boom will be on. Some 60 producers think it will be a *fair* year and only 15 a *poor* year.

Reasons for a Good Year in 1921

Various reasons are given for believing that this new year will be a prosperous one for the rock products industry, the principal one being that there is a large amount of pent-up construction work which *must soon* be started. This is particularly true of municipal and public works in general, including highways, as well as general building. In fact all lines of construction except factory building bid fair to develop in large measure before the end of 1921.

Of course many say frankly that their opinion is a mere guess or possibly only a hope. Some refuse to venture an opinion on the ground that anyone's is useless. Needless to say we do not agree with that, but granting it to be true, it is certainly very significant that such a large majority are so optimistic. Depressions and booms are more the results of mob psychology than anything else, and when a great majority of the people feel sure of prosperity it is bound to come. Therefore each and everyone can perform a real service to the industry by believing and talking prosperity at this time.

Price Tendencies

Next to the general outlook the most interesting subject is the tendency of prices in 1921. Of course this in a large measure is somewhat dependent on wages, freight rates possibly, and to a very large extent on the probable transportation conditions.

On or about December 1 nearly half of the producers of building materials

throughout the country were evidently convinced that wages would not fall appreciably in 1921. Since then of course unemployment has increased somewhat and

pect that it will be materially relieved for several years more, as it must come chiefly from Italian and southern European immigration.

Again wages are to a considerable extent determined by local conditions and it seems rather certain that rock products producers in Michigan, Ohio, and other eastern industrial states will not have to bid against the automobile, rubber and like industries for common labor for a year or two at least.

On the other hand there is a strong probability that the railways will engage in more construction and track improvement work in 1921 than for several years past. This will to a large extent determine the wages that many operators will have to pay. Moreover, if anything like the amount of construction work develops that most producers believe will come in 1921, it is quite certain there is more likely to be a shortage of construction labor than a surplus.

The conclusion as to the labor situation is that while there is a possibility of wages being forced down 10 to 25 per cent at the beginning of the season, there is a strong probability that they will come back to their present figure by mid-summer, and that a producer who figures his season's prices on the assumption of an appreciable reduction in labor cost is taking a plain gamble.

It is questioned by many whether it is good policy to materially reduce wages at this time, with the ever present prospect of a labor shortage later on; many believe that greater economies in labor cost will come from maintaining good wages and selecting the more efficient, than in reducing wages to the lowest possible limit. The producer who has a fair appreciation of the cost of labor turn-overs and of the value of an efficient working organization will certainly take this into consideration.

Opinion in the industry relative to *reducing prices to stimulate buying* irrespective of whether costs justify such reductions or not, is about evenly divided. A very considerable majority of crushed-stone, sand, gravel and slag producers are against such a policy, and apparently with a very good reason, for the prices of these commodities in general have been lower than 1920 operating costs justified; experience has proved the prices of these commodities are not elastic; those established at the beginning of the season are very likely to be maintained throughout the year; and prices of

The Law of Averages

IN SPITE of the fact that the writer is not a close relative of any long whiskered "prophet," I'm satisfied that 1921 will make it possible for all who are worthy and well qualified to adequately provide sustenance and reasonable luxuries for those lawfully and morally entitled to same. There may be gnashing of teeth here and there, but as a whole, based on the 1921 years of history, methinks we'll experience the results based on the law of averages.—A Michigan Gravel Man.

wage reductions have already been accepted in many industries.

In general, however, the industries which now show a surplus of labor supply are not those from which the producers of building material can hope to draw on very heavily, for this surplus is mostly from the textile, clothing, boot and shoe in-

Let Nature Laws Alone

IT IS my personal opinion that the law of supply and demand is going to adjust conditions in this country better than they can be adjusted by law or organizations. Within the next three years I believe conditions will be approximately as they were in 1916 excepting that wages will be somewhat higher, and commodities higher in the same proportion.—A Florida Stone Man.

dustries, skilled workers in the automobile and various machinery industries, and is not of the husky type to work in a quarry or gravel pit.

There has been a serious shortage of quarry and construction labor in this country for several years, and there is no pros-

such commodities when not based on an accurate knowledge of cost of production are a menace to the industry.

Nearly all the producers make the point that rock products are not and never have been in the profiteering class and that such price reductions as have occurred in commodities like lumber can not possibly occur in their industries. If this is true, and we certainly believe it is true, the only way to convince the public is to have the courage of the conviction and keep a stiff backbone.

Rock products producers have always contended that they are satisfied with a fair profit. History of the industries proves they have often had to be satisfied with no profit at all, and as a matter of fact they have to be satisfied with a fair profit or invite an avalanche of new competition, because it is impossible to control sources of raw materials which are so plentifully distributed in this great country of ours.

Freight Rates and Transportation

Increased freight rates on raw materials have had a very appreciable effect on the cost of manufacturing portland cement in many cases, but in the majority of these cases reported the railways have already shown a willingness to make adjustments. Increased freight rates in some cases have had the effect of clipping the wings of the larger quarry and lime companies, which have hitherto shipped long distances and this may have the effect in certain instances of reducing the production of those plants and correspondingly increasing costs.

The biggest factor influencing prices of rock products in 1921 will undoubtedly be the prospect of getting adequate transportation service. The cement industry in 1920, in spite of the enormous demand, operated only to about 75 per cent of the normal capacity of the mills. The lime industry did about the same, as did also the gypsum industry. Producers of sand, gravel, crushed stone and slag in only few instances were able to operate to more than 50 per cent of the normal capacity of their plants.

These restrictions on output in the face of an unprecedented demand early in the season were caused both by labor and transportation shortages, as well as fuel shortage in the case of lime and cement plants, but by far the biggest factor was the car shortage and the Interstate Commerce Commission orders giving priority to coal movements.

The entire construction industry is so overwhelmingly in favor of the repeal of those sections of the Esch-Cummins railway law which make priority orders possible, that it seems certain that there will not be a repetition of this trouble in 1921. There is not likely to be the same competition for railway labor by the automobile industry that occurred in 1920, and consequently there is less probability

What Local Governments Can Do

THERE IS not much the Federal or State Governments can do to encourage the construction industry. In general we have had too much Governmental interference and it will probably be best if they let us work out our own salvation. The one thing which outstands as particularly damaging to the construction industry at the present time is the high tax rates of all kinds, particularly those affecting mortgages on real estate. We would like to see the states in this district (Missouri Valley) provide laws for the registration of mortgages such as are now in effect in some of the Eastern States. We believe such a law would reduce the taxes on mortgages and make them a more desirable form of investment.—A Kansas City Sand Man.

of a switchmen's strike or other railway labor troubles.

Fewer open-top cars, as well as box cars, will be required for hauling automobiles and accessories, and, it is to be hoped, the Government will require fewer for the transportation of field guns and other war paraphernalia, than were used for these purposes in 1921. With relatively high wages and more business-like management the railways will unquestionably make more efficient use of their facilities, and to some degree these are being increased. In general, however, the railways will have very little more rolling stock in 1921 than they have had in 1920.

Although the transportation outlook shows a very considerable improvement over 1920 and if shippers and consignees meet the railways half way in expediting car movements and seeing to it that the railways make enough profit to encourage their business initiative, there is every prospect that the transportation situation, while it remains an uncertainty to

be considered in fixing 1921 prices, will not be anything like the mill stone on the neck of the rock products industry that it was in the year just past.

Generally speaking the evidence shows that the increased freight rates have not been in effect long enough, and there have been too many other factors to be considered, to draw any conclusions as to their ultimate effect on the lime, limestone and mineral aggregate industries. There is a widespread tendency to blame the falling off of businesses during the closing months of 1920 on the new freight rates, but in few cases can this be proved. The majority of opinions in the crushed-stone, sand, gravel and slag industries is that up to the present the increased freight rates have not had any serious effects on their business. As is discussed elsewhere in this issue, there is every reason to believe the railways will meet shippers half-way if actual damage to their business interests can be proved.

Remedial Measures to Start Construction

Aside from the encouragement of highway construction, and public works generally, the opinion of rock products producers is practically unanimous that the very best thing that both Federal and local governments can do is to keep their hands off private business. So far as the Federal government is concerned there is pretty good reason for believing that will be the policy for the next four years at least.

Amalgamation of Sand, Gravel, Stone and Slag Associations?

A majority of crushed-stone, sand, gravel and slag producers apparently favor the amalgamation of the three national associations in these fields. The vote was 55 stone men, 60 gravel men, and 3 slag men, a total of 118 in favor of the proposition and 32 stone men and 28 gravel men, a total of 60, against it. Besides these 17 others expressed doubt of the advantages. The vote was therefore about 2 to 1 in favor of making the national issues of these interests the same.

The vote shows, however, that some very large and influential producers in all three industries are unalterably opposed to such an amalgamation and without them the combined association would not be truly representative of the industries, because there are enough of them and their tonnages are so large that they will always form very powerful separate groups.

Moreover the answers to the questions asked in the Rock Products questionnaire show clearly that there is only one issue under consideration by the majority of those who favor the amalgamation. That issue is transportation. Practically every producer in the industry feels that the industry has not had a fair deal in the matter of transportation and a considerable majority believe that the only way to get a fair deal is to fight for it as a powerful national organization.

We'll Say So Too!

WITH the railroads back on an earning basis, where they ought to be, and the general readjustment of the wage scale, with more labor than we have had in years, with more miles of road to build and more houses needed than ever before, we'd say business ought to be good.—A Wisconsin Quarry Man.

Undoubtedly this attitude was the most logical one to take in 1920 when there was ample evidence that the one with the biggest club got the nearest to what he was after. But have times changed? Will the probable repeal of the obnoxious sections of the Esch-Cummins law, or their future disregard by the Interstate Commerce Commission, not change the outlook of the industry on this matter of vital general policy? This subject is discussed on another page of this issue under the heading of "Railway Rates and Transportation," and will be discussed probably in future issues, pro and con, because it is a matter of very vital interest to the entire rock products industry.

It is said that the constitution of the National Association of Sand and Gravel Producers will be changed to admit crushed-stone and slag producers as members. Probably this is the most feasible way out of the present mix-up for then those producers who feel that their best interests lie in fighting out the transportation issue to a finish, as a national problem, can legitimately give their support to the National Association of Sand and Gravel Producers without in any serious manner injuring the interests of their compatriots who prefer to stick to the policies adopted by the National Crushed Stone Association.

Many producers in both stone and gravel industries point out that except where crushed stone is used chiefly as a concrete aggregate there is very little of common interest to the two industries. And should the two industries develop in a national way to the point where they will actively promote their products by publicity and advertising propaganda it is obvious that there will be a conflict of interests, since stone has many uses that gravel has not; it could hardly be expected for instance that the money of an amalgamated association would be used in promoting a product from which possibly only limestone quarrymen would profit.

Except as producers are brought together in groups as in Wisconsin and Nebraska and prove that they can work together in harmonious relations it seems unlikely that we can have a real National Mineral Aggregate Association, and agitation to force one on the rock product industry at this time, in the opinion of many stone and gravel men alike, is unwise.

Stocking Up

Only the cement industry shows a disposition to prepare for next season's business by stocking up on a large scale. There is little or no tendency at the present time for either dealers or contractors to prepare for next season's demands by stocking up or even placing orders. Falling wages and prices in many lines are unquestionably respon-

No "3 in 1 Oil" for This Sand Man!

IT IS A DIFFICULT matter at this time to hold the sand and gravel men together in one Association and these difficulties would be multiplied many times by amalgamating the crushed stone and slag with the sand and gravel. It will not produce the economy suggested, nor will it increase our influence for good in Washington or elsewhere. It is no doubt practical that many local conditions can be greatly improved by the co-operation of the industries and that in National affairs there are matters that can be handled together, but we can see no practical reason for attempting to amalgamate 3 into 1.

—An Indiana Sand Man.

sible for both the producers' and consumers' reluctance, and each and every rock products producer should help stabilize the situation by determining his 1921 prices at the earliest possible moment and by convincing his prospective customers that his stand is based on estimated costs and that there will be slight prospect of lower prices as things commence to boom.

Take Note of This You Gravel Men!

A MIDDLE-WEST sand and gravel producer of experience has a word of advice for all sand and gravel producers (and other business men as well): "That this will be the greatest year in the history of the industry. The demand will be as immense—that will not be to the credit of the industry, but will be to their discredit, if it does not produce great results in the showing of profits.

"Previous to the World's Fair in Chicago, a very careful survey of all the plaster mills on this continent was made and it was shown that all of them working every day and night *solid* could not furnish the stucco for the staff with which the buildings were to be covered. The cement industry was in a most deplorable condition and had been for years with no dividends, mills run down, the beds of plaster easily accessible drawing near depletion necessitating going deeper down—more transporting of the raw material.

"Many of the important plants were in receivers' hands and sheriffs were hanging around others like buzzards, watching a sick lamb. Staff was adopted for the World's Fair. Here was the one bright spot in the history of the trade—here was the chance for these unbusiness-like men to recoup their lost for-

tunes. Certain ones had gotten up this careful survey, showed up the conditions and that they could operate with *wonderful* profit without prohibitive prices. And what happened? They were so greedy for business that they sold in many instances at actual mill cost, and within some six months or a year the whole bunch of producers with but few exceptions, was in the sheriffs' hands, and I know of none of the properties that did not change hands.

"Is the future going to disclose the same perverse lack of ordinary business sense in gravel producers? The high freight rate encourages home consumption, for it acts as a protective tariff to our local producers, but indications are that the chance to make a proper profit, commensurate with the depletion of the gravel beds, the dangers and risks of a number of kinds, will be overlooked and it will be nip and tuck, as usual, whether we make money or not.

"Competition is the life of trade.' Yes, if in the hands of level-headed business men, but the 'death of trade' in others' hands, and these latter, as a rule, are the ones that will not attend our association meetings."

Transportation the Neck of the Bottle

A N EX-RAILROAD MAN, now a prominent mid-west sand and gravel producer, aptly describes the railway problem as follows:

"In my judgment it will be a long time before the railroads can give a real and adequate relief. To my way of thinking car shortage is all camouflage. Take the roads I have in mind. They are all single-track railroads and reached their maximum capacity to move cars 15 years ago. While it is true that by a very strenuous effort they may move more cars this week than they did this week one or two years ago, but next week will be a bad week. They have gained some by introducing larger locomotives and some other elements of efficiency. But these railroads will never give an adequate relief until they are double tracked and terminals very considerably improved.

"Now, that has been the condition for a number of years and will continue to be the condition.

"Our net gain for last year was more per car than we received for an entire carload of material eight to ten years ago. Yet we didn't make as much gross gain as we did ten years ago, and there must necessarily be high prices until we can have an adequate output. If you had a brick plant to produce 12 million a year you might increase the output slightly, but if you want 20 million a year you must enlarge the plant. A railroad is no different than a brick yard."

Quick Rebound Due Soon in the Construction Industry

The Live Lime Manufacturer Should Be Paving the Way to Take Adequate Care of the Business That Is Sure to Come in the Very Near Future

TO DETERMINE with reasonable accuracy the business prospects of the future while in the midst of a depression, is always a hard problem for the business man. The important task of trying to make both ends meet absorbs his attention and restricts his vision.

At the moment we cannot shut our eyes to the present stagnation, but it is imperative to let our minds reflect without bias upon the experiences of the past and the prospects of the future.

We have already had one previous period of depression since the signing of the armistice in 1918. The winter of two years ago, 1918-1919, was in many respects as bad as the present time but there was a great latent demand for goods and materials of all kinds which by the spring and summer of 1919 had started a business boom of tremendous proportions. This boom ran so fast and inflation was carried so far in many lines that a quick reaction was inevitable. Twelve to fifteen months saw us on the downward trend again. We have always realized that business had to move forward by a series of booms and panics, but our experiences of the past generation had not indicated such a rapid shifting to extremes as has developed in the last twenty-four months since the signing of the armistice.

History Shows Sharp Rebound Will Come Soon

We must step back to the great international convulsion attending the Napoleonic wars for some measure of comparison. For upwards of twenty years following that great upheaval Europe went through a series of rapid booms and panics. It is apparently a natural condition to expect after thinking it out carefully. When any condition that flows through comparatively easy and long cycles of change is suddenly upset by abnormal conditions such as the late war, the series of cycles, or periods of change, have a tendency to run more rapidly and to greater extremes until by gradual steps the pendulum slows down to an easier gait.

Here we are with a strong business depression, a period of extreme business activity and back again to another sharp depression, all within twenty-four months. This history and experience teaches us one very important thing. We should ex-

By Charles Warner
President, Charles Warner Co.,
Wilmington, Del.

pect a prompt rebound within a very few months. As a matter of fact for the best development of permanent prosperity, we have to fear too quick and too sharp a rebound to extreme business activity. What we need is to make the next step forward a little more gradual and to make



Charles Warner, President, National Lime Association

the next cycle of business prosperity one of moderation making for increased length.

In many lines during the past few months essential goods have been consumed and wear and tear has been progressing in this country at a more rapid rate than manufacturing. General purchasing stopped many months ago where stoppage was temporarily possible. The continuous depletion of goods in service; the steady but quiet improvement in the average condition of the money market; and the drastic liquidation that has lowered prices of many necessities have al-

ready largely laid the foundation for the next business boom. Its starting cannot be long delayed. Already there are signs of a reviving of purchasing interest.

Immense Amount of Construction Held in Abeyance

In the construction field we have a condition where in most cases building continued actively into the fall period due to the necessity of completing a large volume of work already under way, in spite of abnormal inflation in many directions experienced during the year just closed.

In most sections of the country we find for normal needs a very under-built condition arising from subnormal construction of peace-time work during the past six years. In most sections of the country the architects' boards are full of studies and plans for clients planning aggressive building programs just as soon as their individual retarders are removed.

In one man's case it is probably a question of money, that will be solved with the easing money markets of the next few months. In another man's case it is probably the assurance that he can safely build to completion for a fixed sum with labor serving more efficiently and rapidly and some materials in the profiteering class reduced to fair present-day normal prices, which is necessary to start his particular job on its way.

These many prospects will, in most cases, find their particular trouble cleared up and be on their way within the next few months, and the flow of active business in construction lines will have started.

Cyrus H. K. Curtis, the big publisher of Philadelphia, recently suggested to the business men as a temporary maxim "run as fast as you can to stay where you are."

Application to the Lime Industry

How does this apply to the lime industry with which I am most largely concerned? It seems to me we have one point to bear in mind and two steps to follow.

First as to the point—the lime industry has not been a profiteering industry during the past few years. There may have been isolated cases where manufacturers of lime products have made extraordinary profits, where all the cards fell just right for some particular producer. But nearly

all manufacturers taking into account the prevailing market prices for the commodity, have experienced the usual series of troubles, curtailing production and jumping expenses by car shortage, coal prices, labor inefficiency, etc., so that the profits made have been little, if any, above normal, and in most cases were still inadequate to return to the investor in lime companies a safe net profit on the capital invested.

Should a manufacturer, so fixed, reduce his selling prices and assume commitments with customers on a new and lower price level, selling most of his product at a lower market for the longer part of the year, unless that manufacturer is absolutely sure that his main cost factors are coming down to stay down for the better part of the year?

This is the condition affecting most lime manufacturers today. With the increase in freight rates there is no indication of delivered coal costs being reduced and there is still a serious prospect that contract coal will go higher when the spring contracting season rolls around. Labor, temporarily rendered more efficient and more interested in the job by the present slackness of business, is likely to resume its lax and inefficient attitude when the pendulum of prosperity swings upward. The man who figures ahead can see the very strong possibility of a shortage of labor before the spring of 1921 is past.

Uncertainties Govern Present Situation

A careful study of these factors, having in mind how rapidly we can expect these swings from prosperity to depression and back again to prosperity during this after-war period, clearly shows the great hazard of reducing market prices on any seasonal or contract business merely on the basis of a temporary and small reduction in some cost factors, or the expectation of such reduction. It is dangerous to the highest degree unless the individual manufacturer of lime products is satisfied to speculate on the strong probability of running his business for the year 1921 at a loss. If a substantial reduction in the major cost factors actually develops and shows promise of continuing for some time by reason of a continuance of depression for a much longer period than is expected by the big business men of the country at this time, and when such a condition actually occurs and is assured, then and not until then is the manufacturer of a moderately priced commodity justified in assuming the commitment of lower sales prices on his own output.

The starting of the business boom is dependent upon improved monetary conditions, the liquidation in prices of outrageously inflated commodities and the re-establishment of a general feeling of confidence. Many of these conditions

are already accomplished or in sight within the next month or two. It will not take price reductions in normally priced commodities, manufactured with only a fair profit on the capital, to start the business boom; the other factors that are working out most satisfactorily and quickly are worth a hundred to one in the starting process.

Must Prepare Sound Foundation for Next Boom

How can lime manufacturers do their part to prepare for a sound business boom and to encourage it at the psychological moment, now almost here?

First, get ready. Get your plants in order; get in shape to take care of business when it comes; do all those things in planning and tuning up, reconstruction and thorough overhauling, which can only be done at a time like this, in order to be prepared with adequate tonnage and prompt service when the business boom gets under way the next few months.

Second, thoroughly and accurately instruct all of your sales forces (and any men or women in your offices who have either personal or correspondence contact with your customers), in the true facts about the industry so that they may understand them and pass the information on to the consumers. Send through these channels, the facts that fuel and labor are two of your biggest cost items, that there is no evidence all that you can expect any permanent reduction in these two main cost factors. Explain the needs of a growing business in improvements and extension, that must be made oftentimes without much chance of increasing the general profits of the business, for the purpose of taking care of the customers' wants with better quality and better service. Get before these customers the facts as to the non-profiteering nature of the lime industry, taking it by and large, because of certain information that each manufacturer of his own personal knowledge can explain to his trade. Get before your customers the general information regarding the present depression, the very early prospects of the upward swing going to the other extreme, and that now is the time to buy for the purpose of protecting the consumer for his supplies during the coming year, and by this process moderating the rapidity of the "spring rise."

These points and many others can be properly and effectively utilized by all the sales forces of the various lime manufacturers of the country acting in a fair and honorable way to stabilize conditions and minimize both the extremes of depression and prosperity.

With the mind of the lime manufacturer clearly on the non-profiteering aspect of his industry and on preparations for the next boom, the foundations for which have been laid, we can expect to do our

part fairly as individual manufacturers both to our country and our own business.

Lime Industry in Finland

THE LIME-BURNING INDUSTRY is an old one in Finland. The Pargas lime deposits are the largest and richest in the country. The largest deposit at Pargas is $1\frac{1}{2}$ kilometers (kilometer=0.621 mile) long and 400 meters (meter=3.28 ft.) wide. Borings have been made in this to a depth of 30 meters, but it has been ascertained that it is at least 60 meters deep, and the quality of the stone appears to improve the deeper they go.

The lime was at first produced in earth kilns, but in 1877 the cylinder kiln was first used, and nine were subsequently installed at Pargas. The Pargas Kalkbergs Aktiebolag was organized in 1898. It built a rotary kiln in 1905 which increased its production ten times. A similar kiln was built in 1912. The total production of the Pargas Co., which, in addition to its plant at Pargas, has rented a lime deposit from the town of Wilmanstrand and also has a plant in Helsingfors, is from 1,200,000 to 1,500,000 hectoliters (hectoliter=2.837 bushels) per annum.

Lime Deposits at Lojo

The lime deposits in Lojo were first worked in 1897 and a modern kiln was built there in 1907. The Lojo Kalkverk Aktiebolag was organized in 1914. The company owns about 2,000 acres of land and is giving its laborers plots of ground on which to build houses with the aid of building loans received from the company. Its annual production of limestone powder and of slaked and unslaked lime is about 250,000 hectoliters.

The lime industry in Finland, like the cement industry, is considerably handicapped at the present time by having to use wood in place of coal, which necessitates the employing of many more laborers than would otherwise be needed.—U. S. Consular Reports.

Rates on Kansas Crushed Rock

IN A PROPOSED REPORT on No. 11148, Prince-Johnson Limestone Co. vs. Atchison, Topeka & Santa Fe et al., Examiner F. H. Barclay has recommended a finding that the interstate rates on crushed rock from Leeds, Mo., and Rosedale, Kans., both in the suburbs of Kansas City, Mo., to destinations within a radius of 150 miles from Kansas City, on lines of defendants other than the originating lines were, are and for the future will be unreasonable to the extent that they have been or may exceed by more than one cent, the contemporaneous rates on crushed rock from Kansas City to the same destinations.—"Traffic World."

The Crushed Stone Industry

Hard Hit by Interstate Commerce Commission Rulings and Freight Rate Increases, But Rough Seas Are Crossed and the Outlook is Brighter Than Ever

IN COMPLYING WITH YOUR INVITATION to make a brief statement on behalf of the National Crushed Stone Association, it seems appropriate to state that it is impossible at this time, for lack of official data, to reflect the consensus of the membership throughout the United States and therefore such comments as are made are necessarily colored to some extent by personal opinion and individual experience.

The season of 1920 opened with the rosiest prospects of any during the past decade, due to the elaborate and unprecedented road-building programs of most of the States and the increased requirements of the railroads for ballast. There was a slight hesitancy in the early spring, which was somewhat analogous to the faltering steps of a convalescent's attempt to walk after a spell of illness, but as the weeks rolled by the activities crystallized and by the first of June hope and expectation were realized.

Rising Prices of Coal

Unfortunately, however, the clouds began to gather. General business activity created a demand for coal, which rapidly stimulated prices, and in the competition certain sections of the country and certain consumers, especially the public utilities throughout the United States, permitted their stocks to be depleted through a reluctance or financial inability to maintain them at the already high and rapidly soaring prices. The inadequate transportation facilities, inducing the railroads to transfer the burden of car supply to the Interstate Commerce Commission, concentrated attention and accentuated the nervous anxiety of a threatened coal shortage.

It cannot be contended that the government should have sat idly by and witnessed an exhibition of the survival of the fittest in the competition for fuel, where such survival would not have been the fittest in the national interest, and the Interstate Commerce Commission took the action under the authority of the Esch-Cummins law to assign cars for special consumers, with the results of which everyone is familiar. It is interesting to note that however necessary had been the action of the Commission to meet a critical situation the details of their action resulted in a very great and unnecessary loss to certain industries, particularly that represented by this association. A brief consideration of this phase of the situation seems worth while.

By John Rice

**President, General Crushed Stone Co.,
Easton, Penn.**

What "Spot" Coal Cost the Stone Industry

Coal contracts contained a provision under which the supply of coal furnished was in proportion to the number of cars received at the mines as compared to their stipulated allotment based on production. When the Commission therefore assigned

ducers were under contract for delivery and could not pass the added expense along.

It therefore becomes quite apparent (and the Interstate Commerce Commission may well obtain a lesson from this experience) that if circumstances require their control of the car supply in future some method must be adopted by which the price of the special commodity affected will also have to be controlled, so that unconscionably inflated prices resulting from an artificial situation shall not have to be borne entirely by the less favored consumers. It may be admitted that some consumers must be favored with a supply but it is obviously unjust that they should also be favored in the matter of price.

Association Adopted Policy of Co-operation

At the first rumors of car shortage in early June the officers of this Association, meeting in Chicago, recognized the difficulties of the situation and made every effort to co-operate with the railroads in the matter of car supply and addressed the Interstate Commerce Commission in the same spirit, praying, however, that cars might be permitted for use where shipment was in the direction of return haul to the mines. As the result of this liberal and unselfish spirit the Association received many congratulatory letters from representatives of the railroads throughout the United States, including the presidents of some of the largest systems, as well as lesser officials, commending the Association for its broad-minded stand; and perhaps in some measure the order of the Commission permitting the use of cars in the direction of the mines was a sympathetic recognition of this attitude.

During the hearing in Washington representatives of the Association presented their case before the Commission. Literally, tons of documents and evidence bearing on all sides of the question of car shortage was presented to the Commission. It would have been impossible for the Commission to have made even a slight attempt to digest all the various phases of the situation, and it is hard to say whether the stone industry suffered disproportionately to other industries in the matter of car supply, but it is believed that the Commission did the best they could under the circumstances, except in the matter of the control of fuel prices,



John Rice, President, National Crushed Stone Association

cars for shipment to certain specific territory or to certain specific consumers such consumers naturally received their coal at their contract prices, whereas all other consumers received only such coal at contract prices as their proportion of surplus cars over those assigned permitted. Consequently, the less favored consumers received approximately from 25 per cent to 40 per cent of their contract coal and were compelled to bid against each other for the other 75 to 60 per cent of their requirements at prices ranging from 200 to 400 per cent of their contract prices. Conservatively estimated, this resulted in a loss to the stone industry alone of between five and ten million dollars, which necessarily had to be absorbed by the industry, as in large part the pro-

if that lay within their power, as has been heretofore referred to and which resulted in such heavy financial loss to industries affected. If they did not have the power, then it would seem that the power of the Fuel Administration should have been invoked if the situation had been thoroughly visualized. In extenuation, however, it must be admitted that the Commission endeavored to secure the opinion of witnesses as to the advisability of this act without any affirmative support. Perhaps no one realized just what would happen, but it shouldn't happen again.

Effect of Freight-Rate Advances

The freight-rate advance was the next serious "fly in the ointment" of the crushed-stone business and what the ultimate effect of the 40 per cent advance will be on large operations requiring heavy tonnage, and therefore a wide market to enable them to run economically, the future can only determine. The Public Service Commission of New York State suspended the advance in rates on intra-state movements, which suspension has been continued until next February, and this was accomplished without opposition by the railroads operating in New York State, who recognized sympathetically the disastrous effect this would have on contractors in this territory. It is hoped that some compromise rate which will operate to the mutual benefit of the producers of crushed stone and similar products and to the railroads and the public at large, will result from the negotiations which are contemplated for this winter. There may be some further hope that beneficial results to the country at large may follow these negotiations.

Labor Situation

The labor situation during the past season has been, so far as general reports may be relied upon, an improvement on the past several years. The independent position of labor, which has been rather conspicuous during the period of the war, is on the wane. This may result from several causes, viz., a less amount of work for the laboring classes, a greater number of laborers, or (and what is important if true) a keener realizing sense of its responsibility by labor itself. If there be any truth whatever in the latter phase of the situation, it is most sincerely hoped that there will be no retaliatory spirit on the part of employers toward labor to in any sense "get back" at them for their wilful independence and irresponsibility for the past five years.

It is not unnatural under all the circumstances that labor should have been somewhat arrogant; it is therefore quite fitting to suggest to employers to examine their own gardens with a view to discovering any destructive weeds which

may have grown up in them. A greater ethical responsibility attaches to employers than to employees because of their more comfortable lot in life, with greater time for thought and analysis, and also presumably because of better education and larger viewpoint they can better weigh cause and effect. It is believed that it is still a great opportunity for closer association in the spirit of man to man rather than any thought of taking advantage of a changing situation with the intent or hope of "rubbing it in" one class on the other.

Business Outlook for 1921

There seems to be an uncertainty in the general business prospects of the country for the next year, but in contrast to this there seems to be a very bright outlook for the crushed-stone business. Road-building will unquestionably go ahead with renewed vigor, building construction will doubtless increase, although probably not strike its maximum gait next year due to many causes. Moreover, the railroads are hungry and thirsty for ballast and great expectations may be had in this direction. On the whole, there seems to be no business with prospects so flattering for next year and for several years to come as that represented by this Association.

As a last thought, organization is only beneficial to the individuals comprising it as it can perform some service for the benefit of the people at large. If its purpose be only critical and non-constructive, maintained only for the selfish benefit of its members, it will of necessity fade away, but at best it can be no better than, nor in fact as good as, the individual members and just as far as the individual members do their part and measure up to their best impulses so will the organization get the inspiration from them, pick up their better thought and pass it on to others for the mutual benefit of all, both within and without its membership.

Coal Operators' Picnic Ends

THE BOTTOM dropped out of the wholesale market for Central West bituminous coal during the last two weeks of 1920, bringing about the most radical reduction recorded in years. In many instances the reductions cut the price in half.

The mild weather was given as the principal reason at the December meeting of the Illinois Coal Operators' Association in Chicago. Other leading operators said that the reduction was caused by the shutting down of factories all over the country.

The poorest grade of steam coal dropped from around \$2 to 83 cents a ton within a few days. Better grades, which have been selling for from \$7 to \$8 a ton, are

now begging for purchasers at from \$3.50 to \$4.00. Coal which sold for from \$8.00 to \$10.00 a few months ago can be had now for \$3.00 a ton.

George W. Reed, vice-president of the Peabody Coal Co., is quoted as saying:

"The high reconsigning and demurrage charges have also helped to bring about a surplus supply. We wouldn't think of sending out a carload of coal unless it is purchased direct. Then there are those who have purchased the entire output of mines for the year. The longer they hold the more they lose and the slimmer are their chances for disposing of their goods at any price."

Several operators declared that the coal was being piled up at the mines where full production is in progress without a sign of purchasers.

Now Charged That Government Officials Were in on Coal Grab

EACH WEEK adds insult to the injury crushed-stone, sand, gravel and slag producers suffered in 1920. On December 21 George H. Cushing, general manager of the American Wholesale Coal Association, testifying before the U. S. Senate Coal Investigating Committee, among other interesting admissions, told the committee, according to the Chicago "Tribune," of one instance in which government officials cleared a profit of \$675,000 on the sale of 450,000 tons of coal. He stated that he was offered a share amounting to over \$100,000 to participate in the deal, but declined. There were many other such instances, he told the committee.

Much of Mr. Cushing's testimony was given behind closed doors and was not made public. He supplied the committee with the name of the ringleader, said to be a dollar a year man.

Members of the committee, after hearing Mr. Cushing's testimony in secret session, explained that the coal handled by the ring was not sold to the American government, and they doubted, therefore, whether any graft prosecutions could be instituted. The coal was sold, it was stated, sometimes to American consumers in regions where the shortage was acute, and sometimes to foreign governments who were badly in need of fuel for their shipping and industries.

The practice of the ring was to get secret orders from persons and concerns badly in need of coal, enter into negotiations with coal dealers, with whom they usually offered to share their profits, and then deliver the coal at a price about \$1.50 a ton in excess of the purchase cost. The officials were located where they were able to obtain information and give assurances by reason of their positions, it was stated.

Long Deferred Construction Will Bring Big Demands

With Help of a Strong National Organization Sand and Gravel Producers Will Begin to Receive Just Deserts

YOU ASK ME ABOUT the prospects for our industry in 1921. I make no pretensions of being a scientific forecaster and my predictions rest on nothing more than the information gathered from many sources in my travels back and forth across the country. I have watched with a great deal of interest the trend of recent events and I have listened attentively to the opinions of many whose ideas are well worthy of careful consideration. The net result of this questing for a reply to your inquiry leads me to believe that our business, during these closing months of 1920, has been at its lowest ebb, and that all signs point to a continually rising tide of prosperity in 1921. Some of the grounds of my faith are as follows:

In all construction lines we face a hangover or pent-up demand covering more than a three year period. This demand is for structures absolutely essential to the moral, physical and industrial welfare of the nation—a social and economic necessity which cannot longer be denied. As a people, "we want what we want when we want it," and right now, as never before in history, we want houses, so that each of our twenty-odd million families may live in comfort; we want paving and hard roads, that our food products may move swiftly and cheaply from producer to consumer; we want improved public utilities, such as gas, light and power, that our homes and factories may be operated efficiently; we want our railroads improved and extended, better roadbeds, terminals, depots and warehouses, that the commerce of the nation may flow unrestrictedly; and we want a variety of public improvements in the way of sewage treatment, irrigation and conservation projects, hospitals and other public welfare structures. As the nation was united in the winning of the war, so now I view it as united and determined in its demand for these essentials of modern life, and I fail to see any insuperable obstacle to their early accomplishment.

Labor is gradually seeing the folly of "high wages and low efficiency," which curtail production and increase living costs, and is appreciating steady employment at wages based on actual service rendered. Financial conditions—at the moment—seem unfavorable, but we must

By **V. O. Johnston**
President, Lincoln Sand and Gravel Co.,
Lincoln, Ill.



V. O. Johnston, President, National Association of Sand and Gravel Producers

remember that this is but a phase, a necessary and ultimately a beneficial step, in our post-war readjustment. With bumper crops coming to our markets, with production of basic commodities increasing, and with a safe and sane policy of spending, both in private as well as in governmental affairs, succeeding our orgy of extravagance, our national resources will more and more become available for our needs, and money will again begin its cycle freely out of our banks, through our industrial and construction activities, through the hands of wage-earner and producer, back to our banks, ready for another journey.

Our railroads realize that private ownership is on its final trial and are making real progress in efficiency within their ranks. With the stimulus of adequate rates, their officials are making desperate efforts to increase loading, to increase

car-miles per day, and decrease percentages of bad-order equipment. After years of starvation, after an unusual depreciation during government operation and the inevitable disruption of operating forces, they are at last getting on a business-like basis and are determined to meet the heavy obligation resting on them for our national welfare. As a matter of fact, I am satisfied that, but for ill-advised orders from Washington, the railroads could, in 1920, have greatly lessened the discrimination shown our products, could have made a better and more profitable use of their equipment and could have been instrumental in curtailing the disgraceful profiteering in coal. We expect to see them unfettered of this faraway and autocratic control within the next few months, and when that it accomplished and economic laws and practical experience govern our transportation, I look for a marked improvement in their functioning.

A nation's industry cannot be stifled indefinitely by arbitrary orders, made without full knowledge of and notice to the interests affected, and without hearing or apparent concern as to their effects, and not cause a reaction sufficiently strong to accomplish their overthrow. I am convinced that congress never intended to grant an unrestricted control over national industry to the Interstate Commerce Commission and that their unwarranted assumption of such power will, in the near future, receive a well-merited rebuke.

In view of the extensive curtailment of construction work the past year—the complete economic loss of which we cannot yet fully estimate—a slack demand for our products during the early months of the year seems likely, but as conditions approach normal, this ought to rapidly increase and in such volume that 1921 will show a greater total production than any previous year. Costs of production are bound to decrease in some degree, so that the average producer will at last secure a fair margin of profit.

Given a profitable market for his products, with his legal rights to a fair share of available transportation established, and with a strong national association to conserve his interests, the sand and gravel producer will at last begin to receive his just deserts.

Building Demand Accumulates*

There Is No Shortage of Cement Now—Transportation Problem Still Unsolved

A PERIOD of depression is largely a state of mind. We had one after the armistice. We are experiencing one now.

For a year or more up to several weeks ago the conduct of business resembled an obstacle race. Then railroad service was demoralized, production was low, labor scarce and inefficient, strikes frequent, materials hard to secure and high in price. It was difficult to get things done—and everybody wanted to do them.

For the last several weeks business has had a clear way before it. Now railroad service is much improved, production is good, labor plentiful and more efficient, strikes infrequent, materials easy to secure and lower in price. It is easy to get things done—and apparently nobody wants to do them.

The construction industry illustrates this well. During the war building was held back by war restrictions. The result was a large accumulation of work waiting to be done when the armistice was signed. Yet everybody interested in construction work adopted a waiting attitude until about six months after the armistice. Then everybody who had building work to do tried to do it at once, but there were not enough transportation, labor and materials to go around. Prices soared—and the result was turmoil and disappointment.

Building conditions now are much the same as when the armistice was signed. Because of the interferences just mentioned there is still a large accumulation of work waiting to be done. Yet everybody interested in construction work is adopting a waiting attitude. If continued it may result in turmoil similar to that experienced through the last half of 1919 and nearly all of 1920.

Everybody knows that there is a shortage of dwellings throughout the country and that rents are high. Rents will remain high until there are enough houses to supply the demand. But homes are not the only thing needed. Construction work of other kinds must go ahead, notably highways and railroad improvements.

Plenty of Cement Available

All the foregoing explains features of the cement situation not generally known. Some people have feared there will not be enough cement available to supply the needs of a large construction program.

* This statement was furnished by Mr. Affleck's office in response to the editor's invitation to discuss the cement situation. The signature is that of the Universal Portland Cement Co.

By **B. F. Affleck**
President, Universal Cement Co.,
Chicago, Ill.

This is a mistaken impression based on past difficulties. The trouble in the last year of unusually heavy demand has been not lack of cement manufacturing capacity but inability on the part of manufacturers to keep their plants operating at capacity. The curtailment of cement production was caused by strikes and scarcity of labor at cement plants, strikes in other lines of industry on which the cement plants are dependent, such as strikes in the gypsum plants, the strike of coal miners a year ago, the strike in the Illinois-Indiana coal fields in July, the strike of railroad switchmen which extended through the greater part of this year, and the general lack of transportation facilities, including embargoes on the railroads. The ratio of cement production to manufacturing capacity for the entire year 1919 was only about 54 per cent, and thus far in 1920 about 68 per cent. The capacity of all cement mills in the United States is 125 million barrels or more annually. The most cement ever used in the country in any previous year was about 94 million barrels in 1916. That is to say the country has never used as much as 75 per cent of its productive capacity, conservatively estimated.

There is now and will be plenty of cement to supply the country's needs as long as transportation and other conditions permit cement mills to operate reasonably near full capacity and to ship the finished product.

Transportation Still a Problem

Many people are too complacent about the railroad situation. Undoubtedly railroad service has improved greatly through increased efficiency in operation, but the roads are not now called upon to do what they were called upon to do through the last year. Business in general is slowing down and farmers are holding back their products from the market. Business in general is sure sooner or later to revive, and the farmer to send his stored products to market. When both or either of these things occur the railroads will again have more than they are able to do. If everybody wants cement, the farmer turns loose his grain, and business in general quickens, all at the same time, a lot of people are going

to be disappointed by delays in their work.

At a time like this when owners, contractors and others may be discouraged from undertaking new projects, the fact should be given prominence that all effort, whether it be in the form of money, credits, materials, labor, transportation or what not, that goes into construction work, unlike that going into work of many other kinds, is not consumed. Effort expended throughout the country on many things that are consumed might well go into construction work, where the materials and labor and other things involved are not consumed but transformed into houses, industrial buildings, improved highways, water-power development and other valuable improvements that form additions to the permanent, taxable wealth of the country as well as tools for production of additional wealth.

If construction work is needed and if such work will add to the permanent wealth of the individual and the country at large, it should be carried on when not subjected to interferences that have been present almost continuously since our entry into the war and which may again be present later.

The time to start this construction work is now.

Cement Prices Drop in Kansas City, Missouri

FOLLOWING the lead of the Eastern cement plants in reducing the price of cement, manufacturers in the Kansas City district have reduced the price of cement 20 cents per barrel. The price now is \$2.40 a barrel, f.o.b.

Commenting on the reduction in Kansas City and the greater price reduction in Chicago, L. T. Sunderland, president of the Ash Grove Lime and Portland Cement Co., said, according to newspaper reports:

"Except competition from Eastern concerns there are no factors here to warrant a reduction in cement prices. Labor and fuel are at the same high levels."

The retail price of cement, with the 20-cent reduction, will be \$4 gross, or \$3 with the return of sacks. By taking advantage of the cash discount generally allowed by retail dealers, the net price of cement in Kansas City today is \$2.90 a barrel.

Cement manufacturers and dealers do not look for a further reduction unless there is a further drop in fuel prices.

Gypsum Stocks Are Low and the Demand Probably Will be Heavy

No Evidence of Labor Surplus in the Building Industries and Prices Based on Costs of Production Can Not Stand Much Reduction

THE CONDITIONS CONFRONTING the manufacturer of gypsum products during the year just closing were such as had never before been experienced by him and demanded clear and calm judgment. I refer, particularly, to the continually advancing cost of materials entering into the manufacture of his products; the difficulties which he experienced in securing equipment from the railroads and the steadily increasing cost of labor. This combination of uncertainties as to his costs finally compelled him, in the early spring of 1920, to adopt the policy of accepting business with the understanding that the price in effect at time of shipment would govern. While this policy was a little unusual and aroused some unfavorable comment from the purchaser, it was equally fair to buyer and seller, and was really the only sane policy to follow for the real business man is the one who measures his selling prices from his costs.

This policy is still in effect today, and I am of the opinion that it will continue during the early part of the year 1921, or until such time as there is a readjustment in the labor situation. Labor, as you know, is the important factor in the manufacture of gypsum products.

While I realize that many buyers are holding up orders until such time as a definite price guaranteed for a given length of time shall again prevail, I also know that plaster, as well as other building material stocks, throughout the country, are low, and it is my belief that there will be a heavy influx of orders, especially from the small dealer, in the early spring of the year, and that most of these orders will be placed for early movement.

It is conceded that the newspapers are the chief source of information to the public as regards many things, one of which is market conditions, and it is to be deplored that there is a tendency on their part, to give undue prominence to the bad news and to fail to feature the good, because the latter is so voluminous that they really haven't space for it, therefore, be not misguided or unduly influenced by the daily press.

Unemployment Exaggerated

The unemployment is exaggerated and where it does exist it simply means a

By Roy C. Haynes

Vice-President, Acme Cement Plaster Co.,
St. Louis, Mo.

readjustment and redistribution of labor. The American people are not going to starve themselves, go naked or be deprived of the ordinary comforts of life, and business will soon be fully employed, satisfying the normal requirements of the country, if we will but stop talking "hard times," which are non-existent and will not become existent if we insist on being cheerful and talking cheerfully. Values and the inspiration that makes for constructive activity, are largely a matter of sentiment, and just now those who feel "blue" because they are sick and disappointed should keep their mouths shut and their pessimism to themselves. Why waste time in idle moping, remember, "The happy have days and these they

use; the unhappy, hours, and these they lose."

Stability in business, at this time, is of the highest importance and every manufacturer, to the extent of his opportunity and ability and even at some sacrifice, is obligated to assist in stabilizing and maintaining prices on a fair and sane level. The producer, the consumer and the workman will be benefited by this attitude.

Considering conditions as a whole, it is exceedingly perplexing, in fact one might say, impossible to forecast the future with any degree of intelligence, but with little or no stocks of plaster or other building materials in the warehouses of the dealers, the early restoration of something like normal labor conditions, the constant influx of more people into this country, I see no reason why one should be anything but optimistic, for all these things are bound to result in a resumption of building activity.

Conditions in Lehigh Valley Cement District

WHILE CONDITIONS in the cement industry at the moment are not the most encouraging, there is no evidence of any extensive curtailment at the larger mills in the Lehigh Valley district of Pennsylvania. Stocks for the most part are low and up to within a very few weeks current production has provided simply for immediate requirements. Railroad conditions are gradually approaching normal and there is now no difficulty on this score, labor is plentiful, and the coal supply has been coming along at a sufficient rate for constant assurance of operations. In the vicinity of Allentown, the Atlas Portland Cement Co. and the Lehigh Portland Cement Co., have been operating full. These plants have a maximum combined capacity of about 40,000 barrels of cement per day. The Lehigh company, after running at good output at its West Coplay and Ormrod plants the first two weeks in December, suspended further production until early in January, when workers have been ordered to report for definite instructions. The storehouses at these mills have but little reserve on hand at the present time. The Coplay Cement Co., Coplay, sus-

pended operations early in December at its local mills, and no announcement has been made regarding re-opening. The curtailment includes the majority of the workers in the packing department and certain other branches of the works. This plant is low on stocks, and the storehouses are not, by any means, in position to handle extended quantity orders.

The Alpha Portland Cement Co. closed its mill at Martin's Creek, N. J., on December 24. No announcement has been made as regards re-opening, and it is said that this is dependent upon market conditions. The plant has been giving employment to about 600 men. The Vulcanite Portland Cement Co. has also suspended operations at its mill at Alpha, N. J., and it is the intention to remain closed for at least a month; during this time a number of improvements and repairs will be made at the plant, which has been utilizing a working force of about 400 operatives. The Edison Portland Cement Co., New Village, N. J., suspended operations for about two weeks during the holiday season, and is expected to resume at an early date; present market conditions are given as the reason for the curtailment. The plant has been giving employment to about 500.

The Phosphate Rock Industry

**Small Chance of Lower Prices Even If Wages and Other Costs Fall Appreciably—
Present Operations Mean Heavy Investments for Land or Royalties**

UNTIL ABOUT 1893, practically all the phosphate rock produced in the United States came from South Carolina and Florida. It was mined under the cheapest labor conditions, and prices averaged about \$16 per ton at the mines. In 1893 or 1894, the blue rock fields in Tennessee were discovered, followed in 1896 by the brown rock discoveries in the Mt. Pleasant district.

The first Tennessee material handled was from outcrops with practically no overburden, and comparatively dry, the operation consisting in digging and loading into cars without further preparation. Large numbers having no previous experience, engaged in mining in small operations, and farm labor was used at cheap prices.

As a result the average price dropped to \$3 and less, and the writer knows of one contract at \$1.10 per ton as late as 1897.

The general impression was that unlimited quantities of phosphate rock existed in middle Tennessee, ready for mining and loading without preparation, and the buyers used this to hold down prices and select only the highest grades. Properties containing high grade deposits were purchased at farm values, and leases were made on royalties as low as 10c per ton.

Then followed enlightenment. It was found that workable deposits were much less plentiful than first represented, royalties advanced, and mining became much more difficult. To furnish the quality required, it became necessary to adopt expensive methods and construct elaborate plants. The old farm hands were not sufficient, and labor had to be imported at a higher wage.

In 1907 the average price of rock had advanced to \$7 and more per ton. In 1908, the panic, following a large production and storage, caused sales below cost of what was on hand, and a temporary cessation of mining. Then followed a gradual advance until in 1914 the prices of 1907 had again been reached and passed.

The South Carolina mines, on account of exhaustion and comparative low grade, were then out of the market. Florida was furnishing the major portion of its product for export to Europe, and Tennessee became the most available producer for domestic purposes. Then suddenly, the war stopped foreign shipments, and Florida rock prepared for export was

By John Ruhm, Jr.
Vice-President and General Manager,
Ruhm Phosphate Mining Co., Mt.
Pleasant, Tenn.

dumped on the domestic market. Sulphuric acid advanced to such a price that fertilizer manufacturers were obliged to limit their production of acid phosphate, and therefore, their purchases of phosphate rock. Prices again reached a low level of \$4 to \$5 for average grade.

Discontinuation of mining in Florida on account of labor strikes later helped the situation to some extent, and cost of supplies, etc., and advances in labor and coal began to show effect, until, at the beginning of 1920 the average grade of crude lump rock reached a price of \$8.50 and \$9 per ton—with ground material sufficiently higher to cover grinding and extra handling.

The first mining in Tennessee was done with farm negroes at 65c to 75c per day, one man being able to get out ten to twelve tons; royalties were from 10c to 25c; preparation was simple, with no plants or overhead.

By 1907 common labor cost \$1 to \$1.50, the average results of one man being much reduced; royalties advanced to \$1 and \$1.50; and the operators put up plants and assumed overhead costs. Coal cost 80c at the mines.

Now, in 1920, common labor has been raised to a base price of \$3, with an efficiency per man of about one-third what it formerly was; royalties of \$1.50 to \$2.50 per ton are being paid, and all operators handling in quantities have costly plants, with heavy upkeep and overhead. Coal contracts average \$3 at the mines.

Notwithstanding these changed conditions, general prices on contract sales for 1920 have only been about \$1.50 to \$2.00 higher than in 1907, or an advance of about 20%.

Each year has further developed the fact that workable deposits of phosphate rock are limited, and has greatly increased the value of the material in the ground—the first properties when purchased outright having been acquired at fair farm values, while now virgin holdings, when at all obtainable, are bringing ten to twenty times that amount.

While there is hope for some reduction in cost of labor and coal, there is no

chance of getting back to the old basis of \$1 to \$1.50 for common labor, and 80c for coal—these being the main part of the production expense; nor will it ever be possible to bring our negro labor back to the state of their efficiency before they were "taught better" by labor agitators.

Buyers at present (overlooking the fact that there has been no such increase in phosphate rock prices as in other commodities, but that instead the war has retarded its legitimate advance to a proper level), are holding off with the expectation of a drop which has not yet developed. It is possible some few low priced contracts may in this way be gotten for material already produced, which must be disposed of; but in the meantime, having no sales ahead, many of the producers will necessarily curtail or discontinue their production, and when the shipping season opens there will be no stocks on hand to meet the absolute requirements. Then history will be repeated.

Since the discovery of phosphate rock in Tennessee there has been a constant price war between producers and buyers. In 1908, on account of the panic, stocks on hand sold at less than cost of production. With this exception, each year during the dull season, buyers have commenced a hammering on prices, and many of them went into their active season with requirements unprovided for. Such stocks as were on hand were actively bid for, there has usually been a shortage, and in every case more finally paid than the prices at which contracts could have been closed in the first place.

Many fertilizer materials, on account of their use in other lines for war purposes, increased to fabulous prices. These necessarily must be adjusted. But phosphate rock had no such boost, and has not yet reached its fair and profitable value, bringing much less now than before 1903, and allowing a very small profit—not sufficient to invite new operations enough to meet the ever increasing demand. It is a necessary material, and therefore we can see no chance for any appreciable reduction from the "war prices" of 1920.

Another significant fact is that many fertilizer manufacturers have from time to time bought up available phosphate deposits. These they do not operate, but are holding in reserve, still buying their requirements. Does not this fact in itself indicate the expectation of a higher value in the future?

Salt Lake Sand and Gravel Plant Has Mountain to Draw On

Utah Sand and Gravel Company Has Just Completed a Most Modern Screening and Washing Plant

A SAND AND GRAVEL OPERATION with an 800-ft. mountain of raw material to draw upon can be accepted as a permanent institution, as sand and gravel operations go, and the builders of the new plant of the Utah Sand and Gravel Co., Salt Lake City, Utah, have proceeded on that assumption.

The plant is an unusual one in several respects as the views herewith show. One of the most striking features is, of course, the method of excavating and handling the raw material and the use of wire suspension bridges to support the belt conveyor gallery and waste-water flume in place of the usual trestles.

This company has two properties, the one described here being known as the North Salt Lake plant. This plant was completed during September, 1920, and began operating with its initial rail ship-

ment on October 1, consigned to a point 155 miles southeast of the plant.

Nature of the Deposit

The deposit consists of clean gravel and sand capped with but little earth overburden ranging from nothing to 14 in. in depth, with areas of considerable size without any overburden. The gravel, generally small with about 75 per cent under 2 in., is composed of quartzite, quartz, granite, schist, and dolomite pebbles.

The holding of this company at this plant consists of 80 acres on the hillside, embracing the high water level of Prehistoric Lake Bonneville and 10 acres of level plant site 700 ft. below. The extent of the sand and gravel deposit is not yet known, the property having not yet been entirely prospected, attention

being paid only to that portion embraced within the semi-circle of 800-ft. radius from the receiving hopper, where test holes have been sunk. Within this area 5,000,000 cu. yds. are now blocked out, with none of the test holes as yet through the gravel deposit.

Flow of Material Through Plant

The pit-run material is handled from the bank to the equalizing plant by a power scraper. It is separated into two sizes—plus and minus 2-in.—by flowing over a woven-wire grizzly, the oversize passing ahead into two bins, each served by a 24-in. apron feeder and a No. 4 gyratory crusher, the undersize passing behind to a bin served by an 18-in. apron feeder.

The undersize is then fed upon a belt conveyor, the oversize passing over a sec-



General view of Utah Sand and Gravel Co. plant

ond woven-wire grizzly, for a further removal of fines, to crushers and then upon the belt. The general procedure is the operation of the three feeders together, with the keeping of the crushed product on one side of the belt for a split division at its discharge when an entirely crushed product is required.

At the conveyor discharge the feed may be sluiced any one of four ways, the crushed product to either or both rotary screens, the dry sand and gravel to either of the rotary screens, and the washed product to either or both units of the washing plant.

From the conveyor head the dry product is passed through the rotary screen for a separation of three sizes of gravel and one size of sand, the sand being then passed over a Wallstein gravity screen and divided into two sizes. The gravel from the initial screen is dropped into a gravity chute, equipped with adjustable openings in its bottom to permit of a grading of the screened sizes. The flow for the crushed product is identical, but separate when desired.

The washed product from the conveyor head is passed through three washing screens for gravel sizing, two hydraulic classifiers for sand sizing and a drag classifier for sand de-watering. The overflow from the hydraulic and drag classifiers is treated in a settling tank

at one end of the overflow flume from which the return water is pumped to the plant.

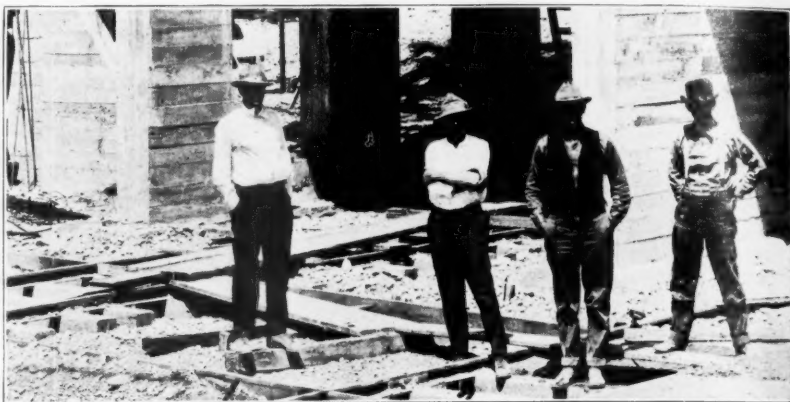
Plant Details

The screening and washing plant is located over a double track, served by both steam and electric railroad spurs, $3\frac{1}{2}$ miles north of the center of Salt Lake City. It is built against the gravel bank, which has a varying slope of from 20 to 33 degrees. The bank is 800 ft. high.

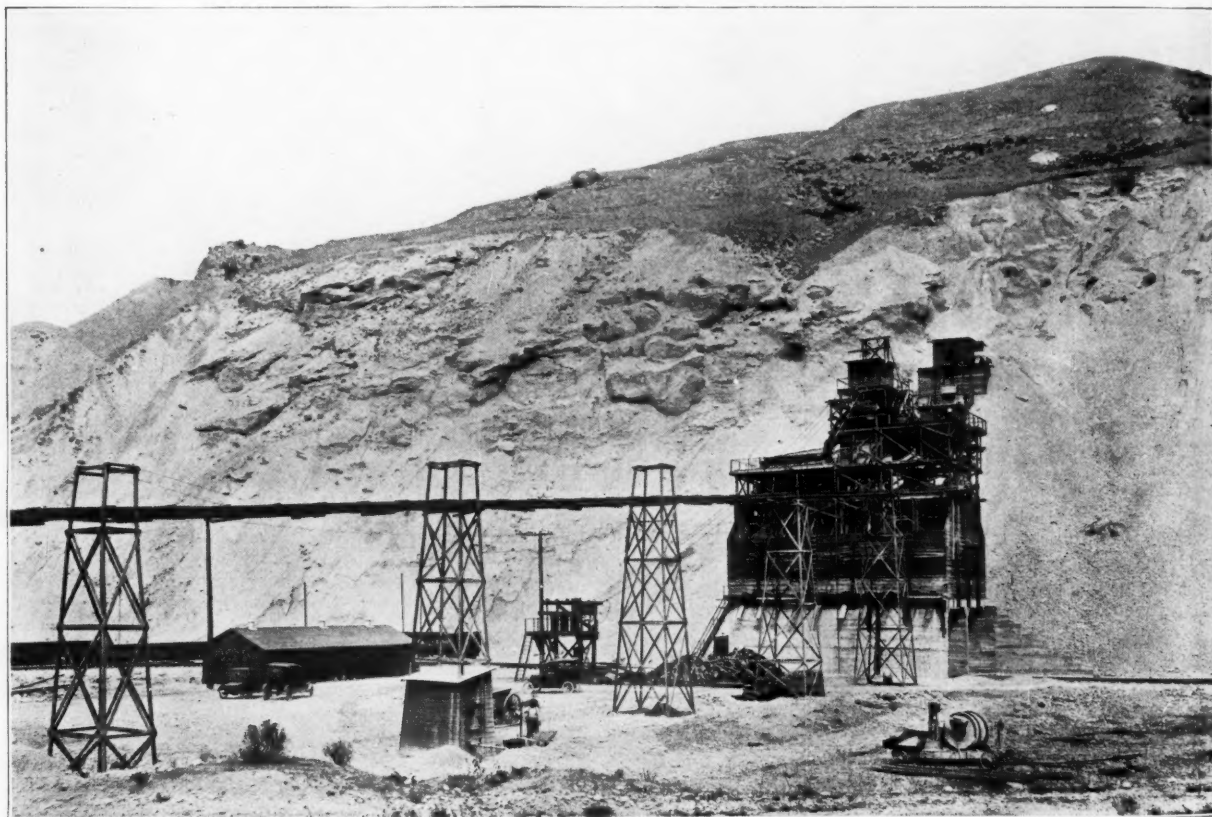
The plant is composed of two main units, connected by a 24-in. level belt conveyor. The upper, functioning as a

receiving, equalizing, and crushing plant, is a bin of three compartments set over a battery of three apron feeds and two gyratory crushers. The material is brought to the bin hopper by an "arrow" 4-yd. power drag scraper operated by a 100-h.p. electric hoist.

The lower main unit, functioning as a screening, washing, and loading plant, is a bin of 1600 cu. yds. capacity, divided into fifteen compartments, equipped with two units each for dry screening and wet screening. The unit for dry screening is composed of one 42-in. by 14-ft. rotary screen and one Wallstein gravity screen.



E. W. Ryberg, W. E. Ryberg and H. R. Sadd



West view of plant—Waste flume in foreground

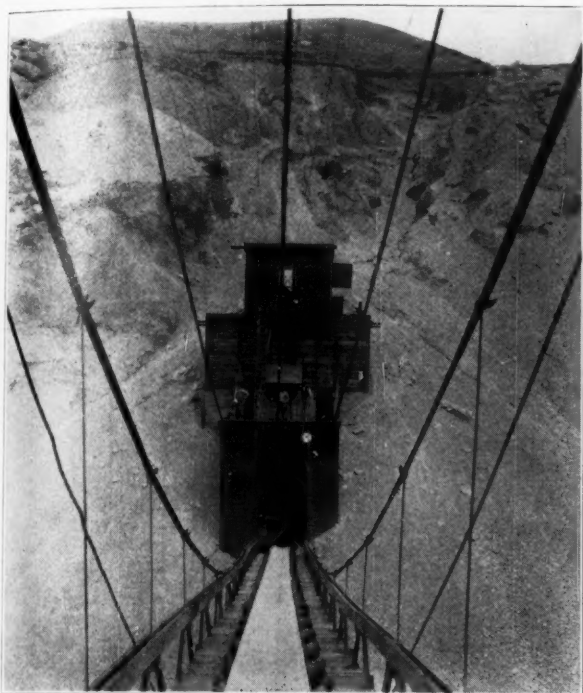
The unit for wet screening is composed of three 72-in. Gilbert screens, one 2-spigot hydraulic classifier or settling tank, and one 24-in. drag classifier, served with a 4-in. centrifugal pump, returning the cleared water from a settling pond.

None of the material is elevated or returned for re-treatment, after passing through one operation.

The plant has an 8-hour output of 1200 cu. yds. loaded on trucks and cars with an operating force of 10 men. It is elec-

trically driven throughout, and is flood-light illuminated for night work, with electric signal control.

Specifications demanding a uniformly graded product have made necessary a somewhat out-of-the-ordinary method of



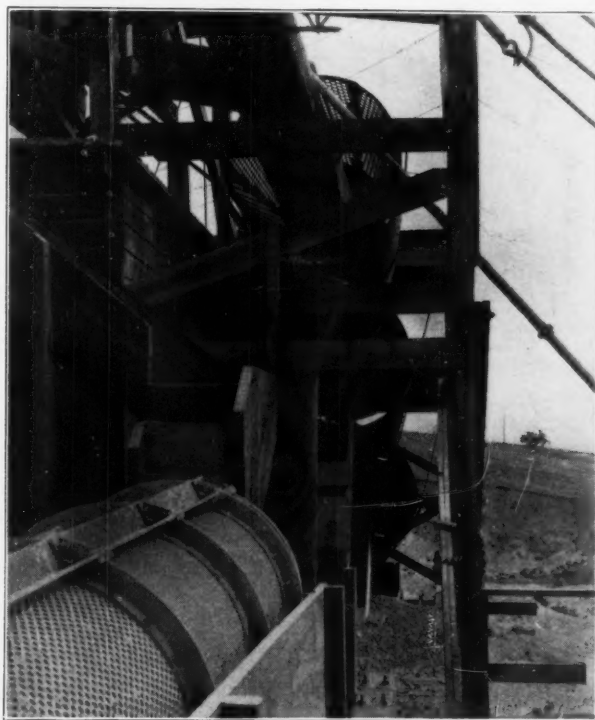
Belt conveyor from crusher—Hoist house above—Material brought to hopper by power scraper



Conveyor belt to screening plant—Note suspension bridge



East view of plant—Note concrete foundations



Section of screening plant for dry and washed material

sluicing the product, after sizing and washing, into loading bins. All or any portion of each product can be deposited in its particular bin or carried ahead and deposited with each larger size in amount desired by inspector. Five classifications are handled and graded according to his idea, minus 12-mesh, minus $\frac{1}{4}$ -in., $\frac{1}{4}$ -in.- $\frac{3}{4}$ -in., $\frac{1}{4}$ -in.-1 $\frac{1}{2}$ -in., $\frac{1}{4}$ -in.-2-in., either washed, dry, or crushed.

Markets

The geographic center of Salt Lake City is about $3\frac{1}{2}$ miles south of the plant by way of a hard surfaced road passing within one-quarter of a mile of it. This market is being supplied by team, truck, and carload shipments, the rail shipments being handled by both steam and electric roads.

The vicinity within the 200-mile radius of Salt Lake City, served by Oregon Short Line, Salt Lake, Los Angeles and San Pedro, Union Pacific, and Denver and Rio Grande railroads, and the Salt Lake and Utah, Bamberger Electric, and Utah Idaho Central, electric railroads, is served by this company.

Personnel

The Utah Sand and Gravel Co. was incorporated at Salt Lake City early in 1920, taking over the Taylorsville plant of the Ryberg Brothers Sand and Gravel Co., constructed in 1919 and the holdings at North Salt Lake City upon which a plant was then under construction.

The officers and directors of the company are, H. E. Hatch, president; E. W. Ryberg, vice-president; Frank Pingree, treasurer; H. R. Sadd, secretary; A. L. Hoppough, W. E. Ryberg, and J. E. Hatch, directors.

The plants were designed, constructed, and are operated by E. W. Ryberg, W. E. Ryberg, and H. R. Sadd, heads of the managing and engineering departments of this company's organization.

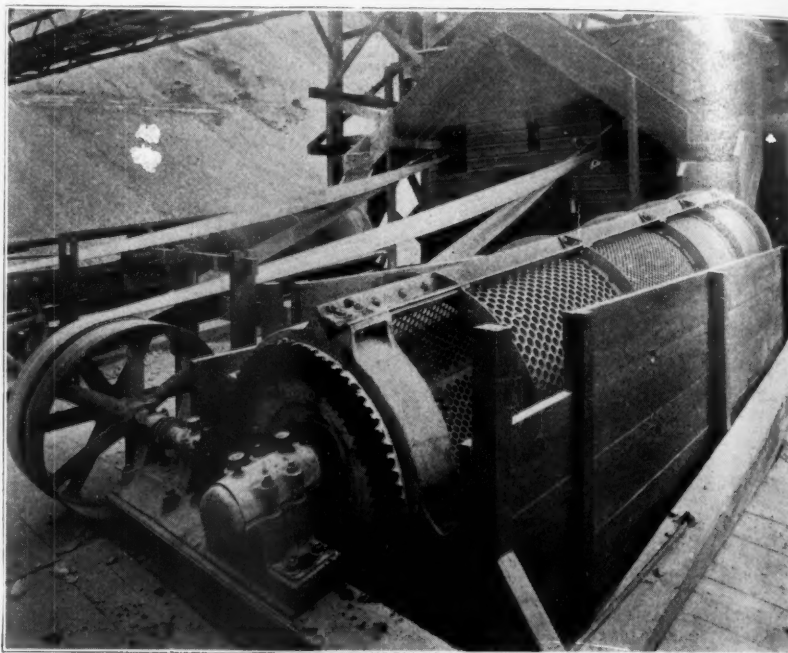
Properties of Dolomite as a Refractory for Furnace Linings

BEFORE 1914 more than 80 per cent of the magnesite refractories for furnace linings were made from Grecian and Austrian magnesite. During the war it was impossible to obtain magnesite from Austria. Imports from Greece practically stopped, and manufacturers had to draw on the Canadian and United States magnesites. The available supply in the United States is confined almost entirely to the states of Washington and California. Approximately 90 per cent of the magnesite refractories are used for furnace linings in metallurgical operations east of the Mississippi River. The steel mills are the largest users of magnesite refractories.

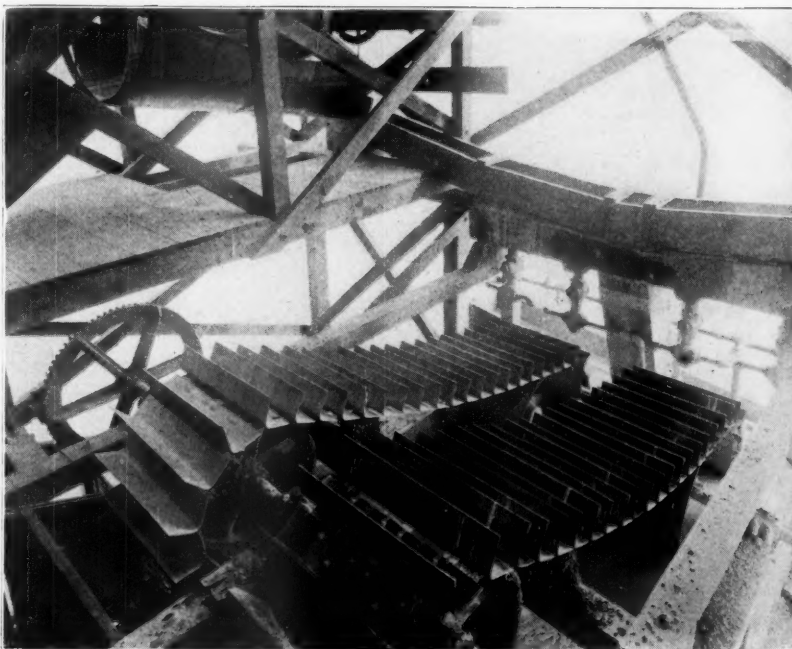
Magnesite for the manufacture of refractories has to be calcined at a temperature high enough to dead burn it or render it "non-slaking." To dead burn pure magnesite effectively requires such an intense heat that it can only be accomplished in the electric furnace at a comparatively high cost. The magnesite of the Pacific Coast states is so pure that it has to be ground with an addition of iron oxide before it can be dead burned

in combustion rotary kilns. Owing to cheap European labor, ease of dead burning and water transportation, the Austrian and Grecian magnesites can be delivered to points in the United States east of the Mississippi cheaper than the dead burned magnesite from the Pacific Coast states can be delivered to the same points.

As far as can be learned, a commercial dolomite fire brick that will stand storage for a year or more without showing



Screen for dry material



Dewatering sand classifiers

signs of disintegration has never been made. A dolomite fire brick that will compare favorably with a magnesite brick in service and will stand storage indefinitely will be the means of developing a new industry, and will utilize an inexhaustible raw material.

The investigation of dolomite was undertaken in 1918 and is approximately 90 per cent completed. Various patented methods of producing so-called dead burned dolomite and a number of methods devised by the Columbus station have been investigated. The two important phases of the investigation are (1) suitable dead-burning agents, (2) heat treatment during the dead-burning process.

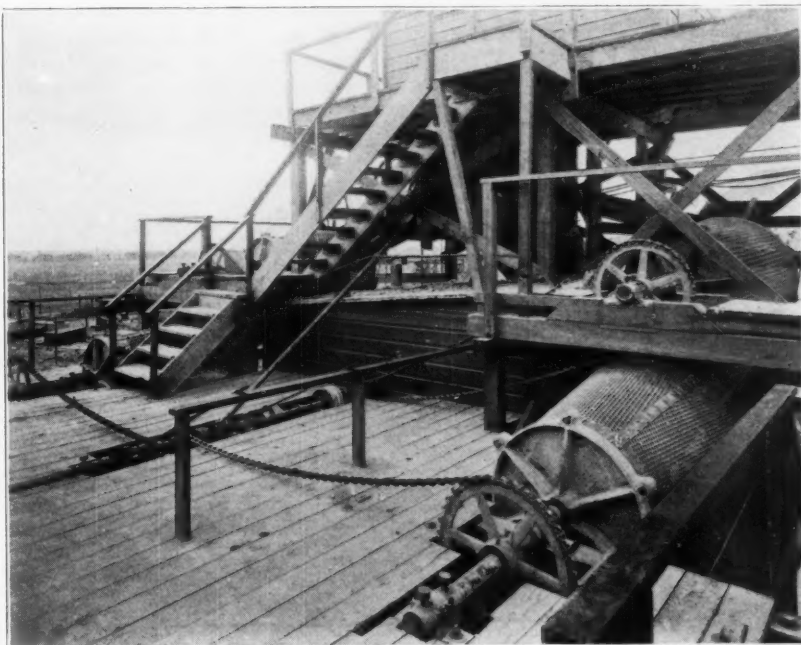
Tests have been made on the addition of different percentages of such dead-burning agents as basic slag, acid slag, hematite, roll scale, surface clay, kaolin, bauxite and different chlorides. The different percentage mixtures of dolomite and reagent were calcined at different temperatures from 1350° C. up to 1750° C.

The most promising results thus far obtained are with test pieces made from 80 per cent dolomite ground with 20 per cent roll scale and calcined to 1410° C.

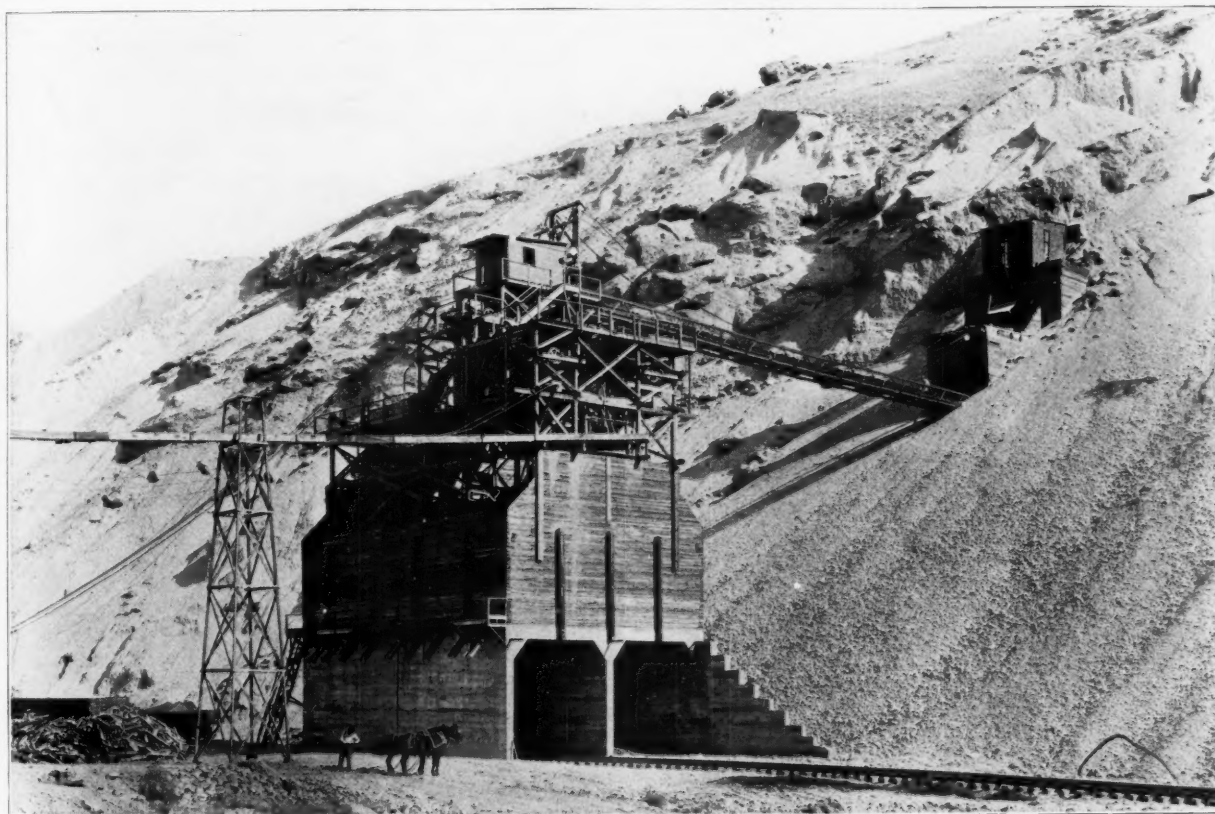
It is the lime content of dolomite that hinders dead burning. Early in the year the Columbus station began experiments in removing the lime from dolomite by

calcining the rock at different temperatures, hydrating and separating the lime by flotation. In laboratory scale tests the lime in Cedarville dolomite was reduced

from 56 per cent to 25 per cent, the lime being recovered as a by-product.—From the annual report of the Director of the U. S. Bureau of Mines.



Screens in washing plant



Southwest view of plant—Note character of deposit



Hints and Helps for Superintendents

Furnace Door for Lime Kilns

THE ACCOMPANYING VIEWS show a home-made furnace door for lime kilns used at the plant of the National Mortar and Supply Co., Cold Springs, Ohio. The doors while not at all unusual, deserve the attention of operators of lime kilns because they have been found particularly satisfactory in this case. It was found that because of the extreme heat of the kilns, the ordinary hinged type door, because of excessive expansion and contraction, would not last, the hinges would crack too easily. To overcome this a bracket was attached to the door, and to this a cable and dead-weight running over two pulleys were fastened. To make the door tight fitting it was mortised on either side and guides provided, as shown in the two views below. Since the above installation the company has had no trouble whatsoever.

These furnaces are also equipped with shaking and dumping grates, which are said to have given entire satisfaction to this company. Clinkers can be caught between the lower part of one of the grate-bar series and the face of the other, and a rocking motion of the shaker arm will quickly reduce clinkers to a manageable size. The grate is so constructed as to withstand a great heat without warping and according to this plant's superintendent the installation has increased the efficiency of the kilns considerably.

These shaking grates as applied to lime kilns are by no means new, but they do not seem to have been applied as extensively as possible. Rock PRODUCTS will be glad to receive and publish for the benefit of other lime manufacturers, the experience any lime plant superintendent has

had with grates of this type, or with any other special device designed to increase the efficiency of an ordinary shaft lime kiln.

A Cash Register for Lime Plant Operation

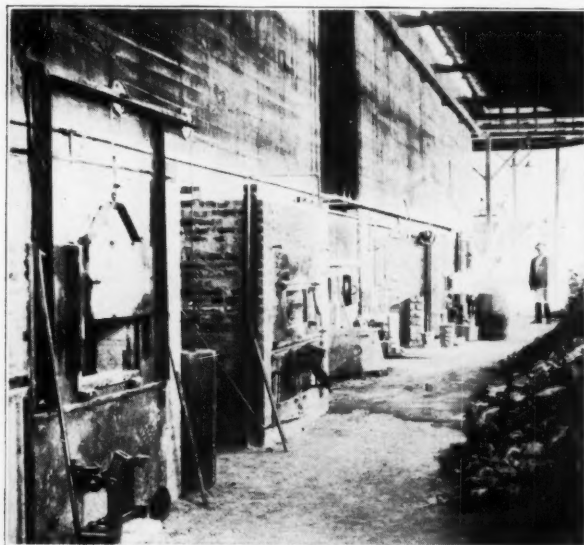
PROBABLY MANY SUPERINTENDENTS who operate on the piece-work system have faced the problem of finding short weight in a loaded car and the necessity of charging back the shortage to the men who did the loading. Of course no one of them will ever take the responsibility for the shortage and to pro-rate this among them is to penalize the honest and conscientious employee along with the careless and dishonest one.

The view herewith shows how John P. Rich, proprietor of the Swanton Lime Works, Swanton, Vt., has solved the problem. Ordinary street-car fare registers, like the one shown, are used for tallying each load of bulk lime put into a car with a wheelbarrow. The loader pulls the cord after balancing the scales with his load. The scales are set to weigh a fixed amount each time. The laborer can easily attain this amount by picking off or putting on an extra lump of lime or two.

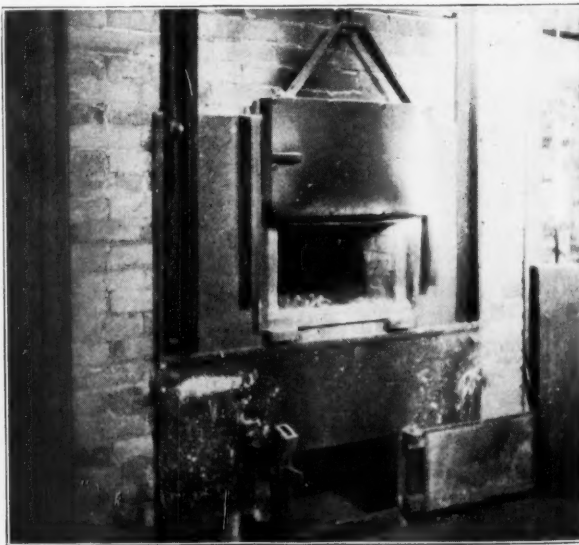
Mr. Rich says: "With the ringing of the bell on the registers each of the different workers, not wishing to be charged pro-rata, jealously sees to it that no false tally is made by any of his fellows. Thus



Lime plant "cash" register



Battery of kilns with counterweighted slide doors



Near view of furnace door showing slides

we "pass the buck" of complaint to them. It is up to the superintendent on each tour of the plant to transfer the register totals to a record sheet, which is turned in as the weight of lime in each car, usually to the nearest even ton of car capacity."

Samuel O'Neil is the superintendent.

Carmichael Stripping Machine

READERS OF ROCK PRODUCTS may recall the stripping machine consisting of a portable belt conveyor bridge, designed and built at the plant of the Atwood-Davis Sand and Gravel Co., Beloit, Wis., and described in our issue of December 18, 1918. Upon the suggestion offered by that device, W. P. Carmichael, president of the Carmichael Gravel Co., Williamsport, Ind., has built a somewhat similar but more rugged stripping machine.

The Carmichael machine is shown in the accompanying views. It is a steel bridge or truss supported at the pit end on a timber tower, the movable base of which is an ordinary flat car. The upper end rests on skids or mud sills. The bridge support at the tower end is pivoted to prevent bending stresses when the device is moved.

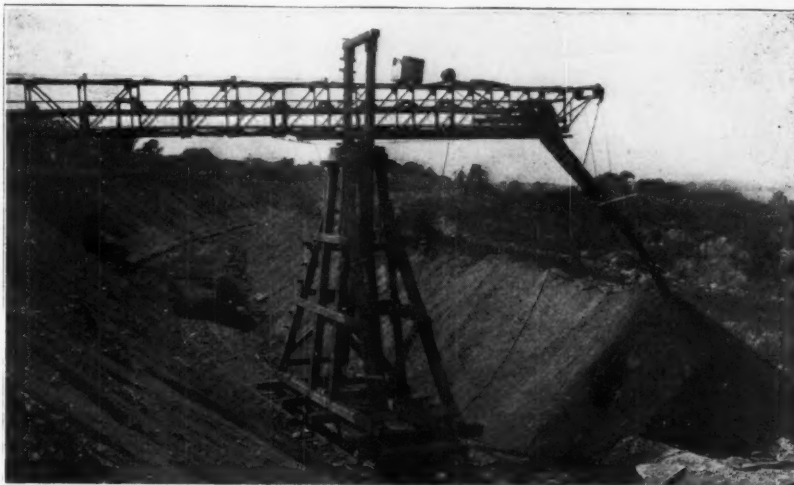
The upper end is provided with a loading hopper and is fastened by a chain to the stripping shovel (caterpillar tractor type), so that it is moved by the shovel. The flat car under the tower end is run on the same track that serves the shovel working in the pit.

The stripping machine thus works ahead of the shovel in the pit and at the end of the run can be readily moved back on the loading track, which is always in place, and started anew at the other end, without interrupting the operation more than a day.

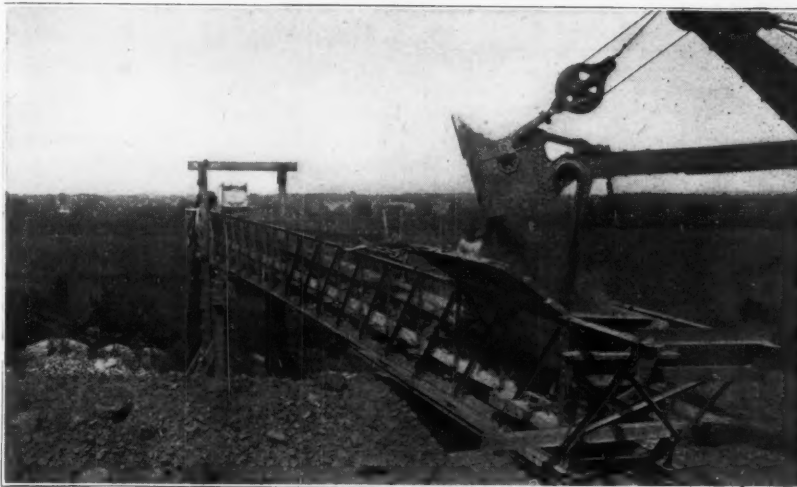
The Carmichael Gravel Co. has its pit at Attica, Indiana. The sand and gravel is removed from the pit by steam shovels, loaded into cars and transported to crusher house, where, after going through a series of crushers, so as to

make the different commercial sizes, it is deposited on a two-stage belt conveyor which takes the material directly to the screens. The screens, which are of the conical type, are mounted in two batteries so that half the material goes through

each, thus giving large screening area and reduced head room. The gravel is screened and washed into sizes from 2 in. down to sand. A complete description of this plant was published in the Oct. 11, 1919, issue of ROCK PRODUCTS.



Pit end of Carmichael stripping machine



Loading end of Carmichael stripping machine



View of the entire operation showing approximate amount of stripping necessary in Attica operation

Practical Chemistry for Lime and Cement Manufacturers

XIX. The Chemistry of Combustion of Fuels—Oxygen Required to Burn Fuels

THE CALCULATION of the amount of air necessary for combustion of producer gas was described in the December 18 issue of Rock Products.

In the case of solid fuels, the reaction must be considered by weight. Thus, from the equation of water formation, we have 32 lbs. of oxygen required to burn 4 lbs. of hydrogen. Hence, to burn 1 lb. of hydrogen, 8 lbs. of oxygen will be needed. Since air is 23.1 per cent oxygen by weight, 1 lb. of hydrogen will take $(100 \div 23.1) \times 8 = 34.6$ lbs. of air. If the volume of air at O°C. and 760 mm. pressure is desired it is only necessary to multiply 34.6 by 12.4, the volume occupied 1 lb. of air, or $34.6 \times 12.4 = 429$ cu. ft.

OXYGEN REQUIRED TO BURN ONE POUND OF VARIOUS SOLID FUELS

	Lbs.
Carbon	2.67
Hydrogen	8.00
Sulphur	1.00

Example: Air required for solid fuel:

ANALYSIS OF COAL

	Pct.
Water	1.9
Carbon	74.9
Hydrogen	4.8
Oxygen	8.6
Nitrogen	1.4
Sulphur	0.7
Ash	7.7

100.0

The combustible elements of this coal are sulphur, carbon and hydrogen. Hence in 100 lbs. of coal we will have 74.8 lbs. of carbon, 4.8 lbs. hydrogen and 0.7 lbs. sulphur. Of this hydrogen, however, part will be required to combine with the oxygen of the coal. Since 1 part by weight of hydrogen combines with 8 parts by weight of oxygen, 8.6 lbs. oxygen will require 1.1 lbs. hydrogen, leaving 3.7 lbs. to be burned by the outside oxygen.

	Lbs. of Oxygen
For carbon	$74.9 \times 2.67 = 200.0$
For hydrogen	$3.7 \times 8.00 = 29.6$
For sulphur	$0.7 \times 1.00 = .7$

For 100 lbs. of coal..... 230.3

	Lbs.
Multiplying by 4.33 we have air.....	997
Multiplying by 12.4 we have air.....	12,363

Products of Combustion

It is often necessary to know the product of combustion of a given fuel in air. This can be readily calculated. When carbon burns in air, for example, forming carbon dioxide, for every 12 lbs. of

By Richard K. Meade, M. S.
Consulting Chemical and Industrial
Engineer, 11-13 Fayette Street,
Baltimore, Md.

carbon burned 44 lbs. of carbon dioxide are formed and 32 lbs. of oxygen are needed. Hence, for 1 lb. of carbon 3.67 lbs. of carbon dioxide are formed and 2.67 lbs. of oxygen are required for combustion. This amount of oxygen carries in with it $2.67 \times 3.33 = 8.89$ lbs. of nitrogen when air is used. Hence, when carbon burns in air the total products of such combustion are 3.67 lbs. of carbon dioxide and 8.89 lbs. of nitrogen. By dividing these weights by the densities of the two gases, respectively, the volume of the products of combustion is found.

Similarly, when two volumes of hydrogen burn, we have produced one volume of steam. One-half volume of oxygen is required for the combustion, carrying in with it $0.5 \times 3.808 = 1.9$ volumes of nitrogen. Hence, the products of combustion when 1 cu. ft. of hydrogen burns in air are 1 cu. ft. of steam and 1.9 cu. ft. of nitrogen. Steam, of course, condenses below 212°F. In the following table, steam has been considered as a perfect gas, and the volume given is that which it would have if it could be cooled to 32°F. without any condensation. This is done to facilitate the calculation.

Referring to a previous example, in which the calculation of the air necessary

for combustion of 100 cu. ft. of this gas is given, we find 90.36 cu. ft. air needed, and since 79.2 per cent of this is nitrogen, the nitrogen accompanying the products of combustion from 100 cu. ft. of the gas is $90.36 \times 0.792 = 71.6$ cu. ft.

Hence, products of combustion from 100 cu. ft. of the gas will be:

	Cu. Ft.
Carbon dioxide	26.9
Water vapor	17.7
Nitrogen	$56.7 + 71.6 = 128.3$
Total.....	172.9

Referring to the example noted above, we find that 997 lbs. of air are needed for 100 lbs. of this coal, and this weight of air is equivalent to $997 \times 0.769 = 766.7$ lbs. nitrogen. Hence, total products of combustion of 100 lbs. of the coal are:

	Lbs.
Water vapor	45.1
Carbon dioxide	274.9
Nitrogen	$766.7 + 1.4 = 768.1$
Sulphur dioxide	1.4
Total.....	1089.5

If the volume is desired it is only necessary to multiply the weight of each gas by the volume occupied by 1 lb., as below.

VOLUME OCCUPIED BY ONE LB. OF VARIOUS GASES AT 32°F. AND 29.9 INS. PRESSURE (O°C AND 760 MM)

	Cu. Ft.
Water vapor (uncondensed).....	19.92
Carbon dioxide	8.15
Carbon monoxide	12.81
Nitrogen	12.77
Air	12.39
Oxygen	11.21

PRODUCTS OF COMBUSTION OF VARIOUS ELEMENTS

Element	Product of Combustion	Produced Per Pound of Combustible	Nitrogen Accompanying Product of Combustion When Air Is Used
Hydrogen.....	Water	9.00	17.4
Oxygen.....	Carbon dioxide.....	3.67	29.9
Sulphur.....	Sulphur dioxide.....	2.00	11.2

Example: Products of combustion from the producer gas given in a preceding example (Rock Products, December 18, 1920).

Analysis		Products of Combustion			
Constituent	Pct.	Solution	CO ₂	H ₂ O	N
Carbon dioxide	5.8	19.8 × 1 =	5.8	.....	.....
Carbon monoxide	19.8	15.1 × 1 =	19.9	.....	.....
Hydrogen	15.1	1.3 × 2 =	.....	15.1	.....
Methane	1.3	1.3 × 1 =	1.3	2.6	.....
		Satisfied by hydrogen	.....	.....	.....
Oxygen	1.3	.....	.....	.....	.....
Nitrogen	56.7	.....	.....	.....	56.7
Total.....	100.00	.....	26.9	17.7	56.7

Example: Products of combustion of the coal given in a previous example.

		H ₂ O	CO ₂	N	SO ₂
Water	1.9	1.9	---	---	---
Carbon	$74.9 \times 3.67 =$	---	274.9	---	---
Hydrogen	$4.8 \times 9 =$	43.2	---	---	---
Oxygen	8.6	---	---	---	---
Nitrogen	1.4	---	---	1.4	---
Sulphur	$0.7 \times 2 =$	---	---	---	1.4
Ash	7.7	---	---	---	---
Total	100.0	45.1	274.9	1.4	1.4

Possibilities for Rock Products Men in Oil Shale

Waste Products After Oil Extraction Suitable for Refractory Brick and Portland Cement Manufacture

By Kirby Thomas, Consulting Engineer, New York City

THE PROSPECT of the development of active operations on a large scale in connection with the business of recovering oil from shales presents some points of operating interest to the rock products industries and also some points of contact with some of the various established businesses concerned in the general field included within the interests of this paper.

The oil shales, which are found widely distributed in this country, usually occur as large beds of shale or slate. They must be mined by different methods, according to conditions. In general, the methods of quarrying will be adopted at the outset. Later, it will probably be necessary to do underground work and in this case the methods of the coal mines will be resorted to, to some extent. It has been found that the shale, which is tough rather than hard, requires special drilling equipment and also presents special requirements as to the method of mining. In some Colorado operations, auger drills have been found most satisfactory. It was first supposed that the hydro-carbon content of the shale, which after distillation amounts to a barrel or more for each ton of shale, in many cases would give off odors and gases which would be objectionable in underground mining operations. However, this was found not to be the case, in the limited operations which have been carried on, and reports from Scotland, where extensive underground work has been conducted for more than half a century, are to the effect that there are no problems relating to gas or odor from the shale.

After the shale has been mined it is necessary to break it to coarse sizes and to do this without producing too many fines. This procedure requires special apparatus and in a general way the problem of breaking or crushing the shale has not yet been solved. The Scotch producers use spiked rollers. The operators in this

country are giving trial to various crushing devices. Some of the processes require a fine ground product and this makes the crushing operation more simple, as regards equipment.

It is altogether probable that some of the operators in the slate quarry industry and those engaged in producing crushed slate for roofing will be in position to give some important points to the oil shale operators.

Waste Disposal Problem

The most important point of contact between this new industry and established business relates to the possibilities which are involved in the enormous amounts of waste material which must come from these oil shale operations, if carried on on the large scale contemplated, or the scale which will make them of serious importance.

The Colorado shales yield, roughly, a barrel to the ton. Kentucky and Eastern shales probably yield half as much. This means an operation of a thousand tons a day will have an enormous accumulation of waste material to dispose of. This material is in fact nothing more or less than very finely ground clay. Some of the waste material contains a fixed carbon, an incidental and undesirable product from the heat distillation of the oil making materials which are in the original shale. This fixed carbon adds certain characteristics to the waste and it has been proposed that some of the waste be used for an insulation material, on account of its high carbon content. Experiments have been made to this end with some success; in fact, the original material is being used in a limited way for the molding and shaping of forms for insulation.

Some of the material is suitable, of course, for brick making, and experiments have been conducted showing that it makes a very excellent quality of brick, and by special mixing and burning can

be made to produce brick of high refractory quality. Such a utilization of the waste would be practicable in settled communities and it is possible that the brick industry of some of the Eastern localities, where it is proposed to develop the shale business, may feel the competition of this new raw material source, or may be influenced to move their plants to the vicinity of the oil shale operations.

Portland Cement Manufacture

A particularly interesting investigation has been made in connection with the use of the waste product as part of the material in the manufacture of cement. Patents have been taken out along this line and sufficient work done to prove that the idea is practical and to suggest that it presents some important possibilities as affecting the cost of cement. The waste heat from the cement kilns can be advantageously used for supplemental heat in the oil shale retorting operation, or in the subsequent refining operations, and on the other hand, any waste heat that may come from the oil shale operation can be directed into the cement kilns, which should result in a considerable heat conservation. The waste material from the shale operation, with proper mixture, makes an excellent cement and therefore the two industries have a twin relation which suggests important possibilities as affecting the future development of both these industries, particularly in the settled communities where there is a nearby market for the cement in large quantities. Ordinarily the limestone and silica used in cement making can be obtained in the vicinity of the oil shale deposits.

In addition to the oil which is obtained from this shale there is also a by-product of ammonium-sulphate which can be obtained in the same operation and by a subsequent leaching, some of the shales yield a potash. If it is possible to use the waste material also, the industry will be on a very sound basis.

Artificial Rock for Roads

THE PRACTICALLY prohibitive freight cost on rock for roads for some parts of the states of the Central West and of the gulf coast region has lead to a revival of the plan once used in a limited way, of making artificial rock by burning local clays to proper hardness and crushing this material for road surfacing.

This plan, while more or less of an expedient, is practicable in some instances and is likely to be resorted to at least to complete pending contracts, or until cement or asphaltum can be made available at a lower cost.

The usual plan is to hard bake local clays in large blocks and to crush these as stone is crushed, to the necessary sizes.—Kirby Thomas.

Control Lime Burning in Shaft Kilns by Use of Pyrometers

Instrument Indicates, Records and Furnishes Means of Control of Temperature for Scientific Kiln Operation

THE PROPER CONTROL OF TEMPERATURES in lime burning is of great practical importance, for it largely governs the output and the economical operation of a kiln. The lime industry in general today has no scientific way of controlling lime burning. It operates entirely on the "hit or miss" method, and has no way of checking the efficiency of a kiln or a kiln operator. In fact, all told, very little is known about controlling of lime burning. It is obvious, therefore, that an indicating and recording system, which will show and record the temperatures in a kiln for burning of lime, is a step nearer the goal of efficiency, for it will enable the manager or superintendent of a plant not only to determine the efficiency of his kiln, but show the value of the fuel used, the service of the fire brick with which the kiln is lined and various other important factors in economical kiln operation. It will serve to keep a check on the fireman if the kiln is hand-fired, and in the event of producer gas being used as a fuel, it can be made largely to control the operation of the gas producer, thereby increasing efficiency of both gas producer and kiln.

An instrument which will do all the things outlined above is the thermo-electric

By Charles A. Breskin
Assistant Editor, Rock Products

pyrometer, the great popularity of which in metallurgical and other industries where control of heat is required is due to its ease of observation, availability for automatically making a permanent record and the possibility of temperature control by means of signals and by automatic regulation. While the thermo-electric pyrometer has been used to some extent in cement plants, it is nearly unknown in shaft lime-kiln operations. It is the purpose of this article to treat with the fundamentals of the thermo-electric pyrometer first, so that a knowledge of its basic principles and working may be gained, and then to discuss a well-tried installation and its adaptability to lime-plant operation.

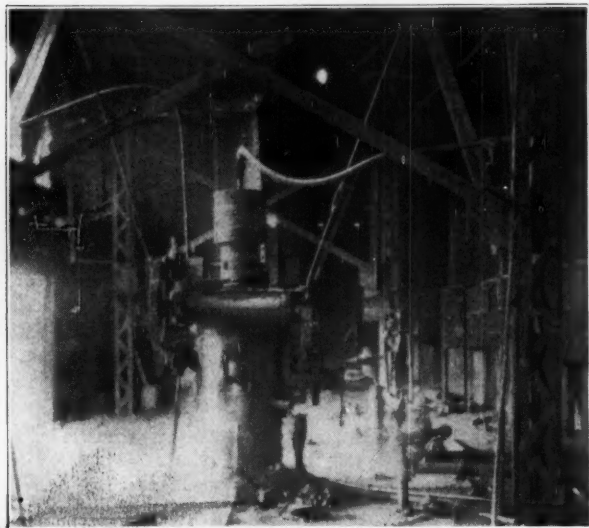
Principle of Thermo-Electric Pyrometer

A thermo-couple consists of two pieces of dissimilar metals, placed at some point in the kiln (above the eyes), and connected by wires to a meter or indicator which may be placed near the kiln or in some other part of the plant. That part of the thermo-couple which extends into the kiln or heated chamber is known as

the "Hot Junction," and it is at this point only that the two dissimilar metals touch. The opposite end or the "Cold Junction" is separated and free, and is connected by means of wires to the indicating or recording apparatus. When the hot end is heated a feeble electric current is generated which is known as electromotive force, or E. M. F. The E. M. F. developed depends upon the metals which make up the thermo-couple and upon the difference in temperature between the hot and cold junctions. The current is conducted then by wires to the meter or indicating part of the pyrometer.

Types of Pyrometers

The pyrometer may be either a high or low resistance type depending upon the amount of internal resistance. In a high resistance pyrometer less of the current generated by the thermo-couple is utilized to move the indicating element of the instrument. The high resistance in the pyrometer is to avoid errors due to changes in the circuit, such as would result from atmospheric changes in temperatures. Hence for use in accurate measurements the high resistance thermometer is superior to the low resistance instrument because, as stated before, errors due to changes in the circuit, and changes in the lengths of leads or wires



Mechanically agitated gas producers



Thermo-couple and lead wires extending from kiln

due to a high resistance would have no effect in the indications. This is also true for the variations in the distance that the thermo-couple is inserted in the kiln or heat chamber. The high resistance pyrometer is usually of the millivoltmeter type, and is desirable where the leads are long, and where one pyrometer is connected to several thermo-couples located at various distances from the indicating instrument. It can be readily seen then that the high resistance pyrometer is particularly adaptable to the needs of lime-kiln operation.

The instrument shown in these views is of the type which indicates temperatures by means of a millivoltmeter, the moving element of which is actuated by

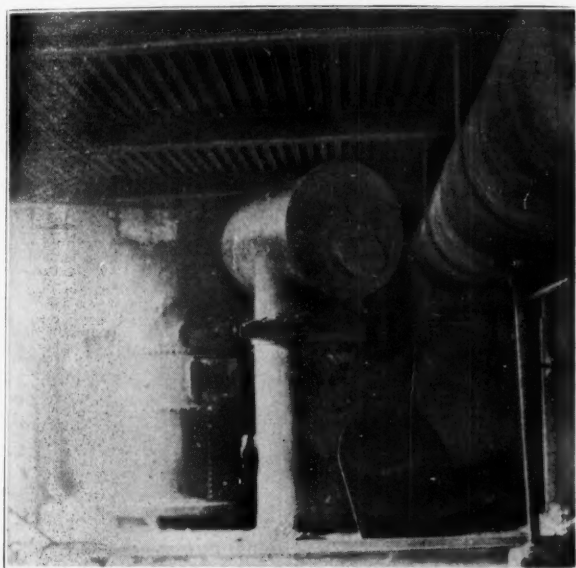
the strength of the current generated by the thermo-couple. When a reading is desired the circuit connecting the thermo-couple at the kiln and the indicating instrument is closed by a switch and then the pointer moves or swings over opposite the graduated scale representing the various temperatures.

Recording Pyrometer

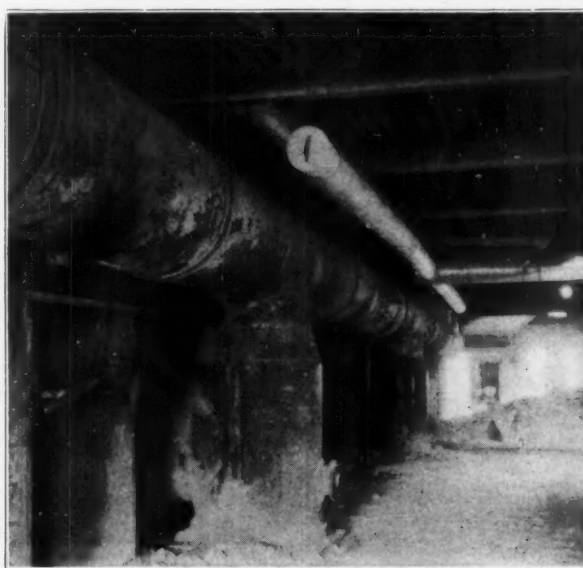
The charts or records of temperatures obtained by means of a recording pyrometer are not only valuable for future reference, but also enable the superintendent or attendant to readily watch the operation of any kiln by merely inspecting the chart. The chart also indicates the general trend of any change which

may occur in the kiln. Therefore, the use of recording instruments tend toward greater uniformity in the quality of burned lime.

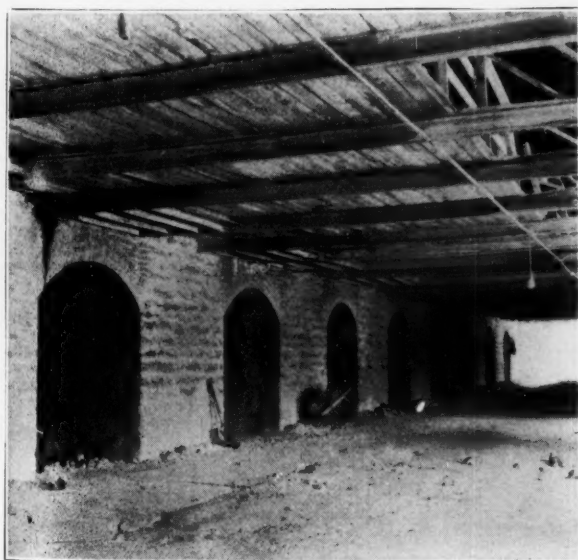
A recording pyrometer is provided with a marking device which traces a continuous or dotted line upon a chart with reference to both temperature and time. By referring to these charts the temperature at any period within the range of the chart is shown graphically. The chart shown in the accompanying illustration is a continuous chart giving a record for 24 hours, and was obtained from a continuous recording pyrometer. The pyrometer here is so arranged that the record is produced by a pointer that strikes a strip of carbon paper and forces



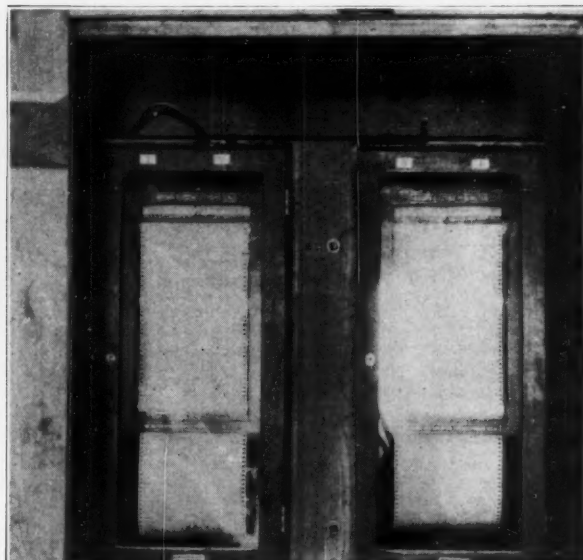
Bottom of gas producer



Gas producer main to kilns



Cooling floor



Continuous recording duplex pyrometer

it against the record paper, thus forming a line consisting of a series of closely spaced dots. The roll of carbon paper passes over the record roll and the pointer strikes the carbon band once a minute, thus producing the record. The record paper and carbon band usually last for a period of two months. The installation referred to above can be either of a single, double or multiple recording pyrometer.

Control of Temperature by Signals

The temperature of a kiln may be controlled in several different ways: First, the fireman or kiln attendant may take the pyrometer readings himself and regulate the heat in the kiln according to his own judgment. Second, the signals for the kiln operator or attendant may be controlled manually by an office attendant or automatically from a special form of pyrometer which is previously set for whatever temperatures are desired; and

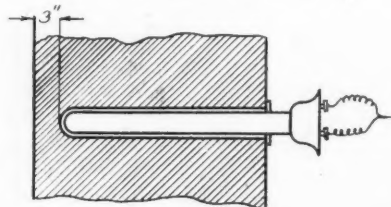


Fig. 2

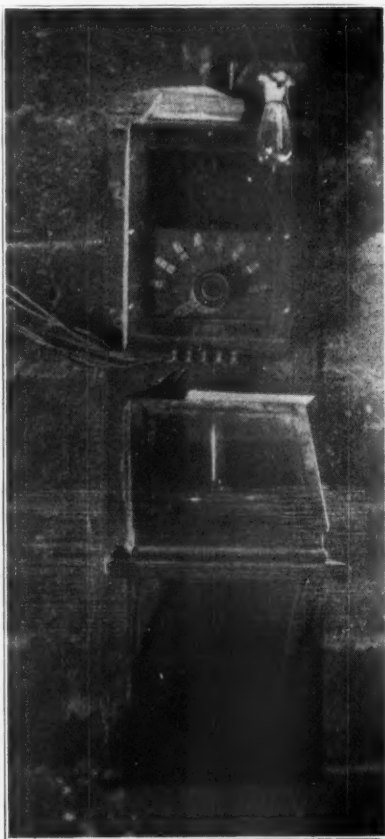
third, the control of heat may be entirely automatic.

When the control is by some method of signaling either colored lights or a bell may be used. If lights are used there is generally three—a red, white and green combination being a common form. These lights are placed near the kiln where the attendant may always have them in view. The red light may show that the temperature in the kiln is too high. The white light that it is correct within certain set limits and the green light that the temperature is too low. Lights may also be used in combination to vary the signals. For instance if the temperature in a kiln should be reduced considerably for some reason or other the green light would be flashed to show that the temperature is too low. The fireman or kiln attendant seeing this would regulate his kiln so as to increase the temperature. When the temperature has increased to a certain point two lights may be switched on to show the attendant that the temperature is still too low, and then one light may be used to show that it is approaching the correct temperature but that it is still somewhat low. Finally a different light may be switched on to show that the correct temperature has been obtained.

This method of signaling is very simple and should be readily understood by

the firemen or kiln attendants. In some cases a bell may be attached in the circuit so that it will attract the attention of the attendant at once. Such bells are usually used in conjunction with the lights, so that they attract the attention of the operator at once. The Brown Pyrometer Co. has such a pyrometer on the market which is so arranged that the pointer is depressed at regular intervals of ten seconds upon contacts corresponding to the red, white and green lights. The particular contact upon which the pointer is depressed depends upon the position of the pointer which in turn varies as the temperature. The three contacts can be adjusted to a position corresponding to the temperature that is to be maintained in the kiln.

The connections between pyrometer, lamps, switch and thermo-couple are shown in Fig. 1. The current for the signal lamps does not flow through the instrument in this case, but is made and broken by an auxiliary device in the instrument. A high resistance in series with the circuit connecting the pyrometer reduces the current flowing through the contactors to prevent any sparking. This system of signaling may be connected to any number of thermo-couples and kilns.



Suspension type pyrometer and selective switchboard

Installation in Kiln

It is obvious that the thermo-couple cannot be placed in the center of the kiln, even in a strong protecting case, as the ever descending rock will soon break it. It is therefore necessary to place it within some point in the fire-brick, and such as installation will only give a relative temperature, and not the temperature in the burning zone, which is really the one desired. The question then arises, "where is the burning zone and where should the thermo-couple be placed in the kiln?" It can only be answered by experiment, as different conditions will require different installations.

The views accompanying this article were obtained by the writer from a visit to the John D. Owens and Sons Co. plant at Owens, Ohio, and the Kelley Island Lime and Transport Co. plant at Clay Center, Ohio. The installation at Owens dates back to 1908, and is the first known use of pyrometers in lime burning in shaft kilns. The couples here are placed 3-in. from the edge of the fire brick (as shown in Fig. 2), so as to protect it from abrasion of falling stone, and about 6-in. above the fire-eyes of the kiln. Of course, the thermo-couple being within the fire brick a relative temperature only is obtained, but according

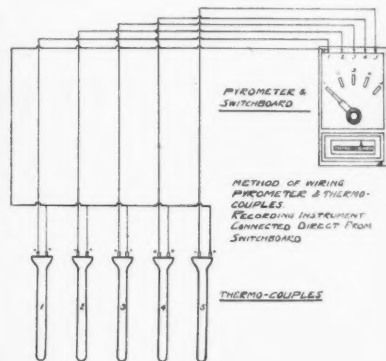


Fig. 1

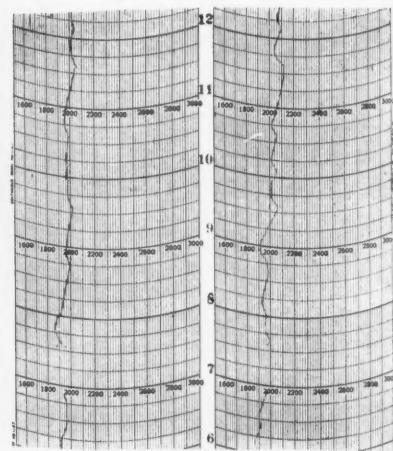
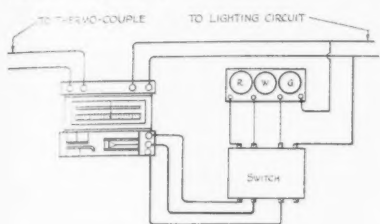


Fig. 3

to B. H. Rice, superintendent of the plant, long experience with the pyrometer has taught them that even with a relative temperature, the lime burning may be controlled to a great extent, thereby increasing the efficiency of the



COMPLETE SIGNALING PYROMETER

kiln, and obtaining a greater output from each kiln, as the use of the pyrometer tends to do away with unburned lime or overburned lime.

At the Kelley Island plant at Clay Center four kilns have been equipped with thermo-couples, which are attached to two duplex recording pyrometers, the chart of which is shown by Fig. 3. This chart is of the continuous type, giving a record of 24 hours and a temperature within a range from 1500° to 3000°F. This range of temperatures, however, can be obtained to suit the needs of any particular plant. The Kelley Island installation is only for experimental purposes, and should the venture prove a success the company will undoubtedly equip the rest of its kilns in the same manner. It can readily be seen that much greater efficiency could be introduced at a plant like Clay Center, where the company operates 54 shaft lime kilns, if a method of scientific control could be so developed as to be supervised by an expert.

The New President of the Portland Cement Association

L. T. SUNDERLAND, president of the Ash Grove Lime and Portland Cement Co., with a lime plant at Ash Grove, Kan., a cement plant at Chanute, Kan., and general offices at Kansas City, Mo., is the president of the Portland Cement Association, elected at the December annual meeting in New York City.

Mr. Sunderland is therefore both a lime and a cement manufacturer. He has found that instead of conflicting these two industries supplement one another very nicely. It is quite possible that his advent as president of the Portland Cement Association marks an epoch of closer cooperation between these two great rock products industries.

The new president of the Portland Cement Association is a man who believes absolutely, as an intimate friend has put it, that "Actions speak louder

than photographs or biographical sketches," so readers in other rock products industries than portland cement, who are not personally acquainted with him, will have to be content with the statement that he is highly regarded by his associates in that industry, to which he has given the most of his personal

attention; but he is associated with other industries which include nearly the whole category of building materials. Consequently the whole construction materials industry is to be congratulated that such a broad-gauge, wide-visioned man has come to occupy a position of such influence and importance to the industry.

The Highway Outlook for 1921

Over Billion Dollars Available for Road Construction Next Year—County, State and Federal Moneys

HIGHWAY construction interests need have no fear that road building will be delayed next year for lack of funds. The final Federal Aid appropriation of \$75,000,000, which will be available next season, together with the state and county bond issues, direct levies and revenue, will raise the total available sum to more than a billion dollars. The sources of these funds are shown in the table following:

Of the total sum thus available, probably not more than half will be actually expended during the coming year, according to the Bureau of Public Roads. A large portion of the bond issues were approved only recently and the time necessary to prepare plans and secure approval of the projects will doubtless limit the expenditures. More significant con-

perience, the material supply appears doubtful, and since the recent creation of well functioning highway departments in many states, thousands of men formerly engaged in construction work are now employed in maintenance. Transportation is improving, but little hope is entertained that it can also stand the strain of a boom in both public and private construction.

The belief is firmly expressed in many quarters that if both public works and private projects go forward in the volume now predicted, a shortage of materials, labor and transportation with attending increase of prices, will be the inevitable result. Whether both classes of construction will be pushed or whether one will be suppressed, are questions to which answers are not yet available.—"Bulletin of the Associated General Contractors."

FUNDS AVAILABLE FOR HIGHWAY CONSTRUCTION, 1921

Total Federal Aid Appropriation.....	\$275,000,000
Forest Road Appropriations.....	14,000,000
State Bond Issues.....	543,000,000
County Bond Issues.....	362,000,000
Direct Levies and Revenue (estimated)	200,000,000
Total	\$1,394,000,000
Less total of projects completed or under construction	264,000,000
Available for new construction, 1921	\$1,130,000,000
State Bond Issues	
1918 (Partly expended)	Colorado ..\$ 5,000,000
Illinois	60,000,000
Pennsyl.	50,000,000
1919 (Partly expended)	W. Virginia .. 50,000,000
California	40,000,000
Oregon	12,500,000
Nevada	1,000,000
S. Dakota	4,500,000
Wyoming	2,800,000
Maine	10,000,000
Michigan	50,000,000
Utah	4,000,000
1920 (New Appropriations)	Alabama .. 25,000,000
Idaho	2,000,000
Oregon	10,000,000
County Bond Issues, 1920	
Alabama	5,000,000
Arizona	8,400,000
Arkansas	2,400,000
California	24,635,000
Colorado	1,515,000
Florida	15,245,000
Georgia	7,373,000
Indiana	8,862,845
Illinois	18,475,000
Iowa	50,000
Kansas	1,700,000
Kentucky	5,850,000
Louisiana	2,300,000
Maine	12,800,000
Michigan	15,773,000
Minnesota	13,504,000
Mississippi	6,283,000
Missouri	3,000,000
Montana	
Nebraska	
Total State Bond Issues available for 1921	
\$543,800,000	
Total State Bond Issues, 1920	
Alabama	1,200,000
Arizona	200,000
Arkansas	13,609,000
California	1,158,000
Colorado	9,696,704
Florida	21,337,553
Georgia	8,500,000
Illinois	7,185,000
Indiana	86,023,000
Iowa	2,766,000
Kansas	8,225,000
Kentucky	7,039,200
Louisiana	36,525,000
Maine	2,800,000
Michigan	
Minnesota	
Mississippi	
Missouri	
Montana	
Nebraska	
Total county bond issues	
\$361,971,537	

National Crushed Stone Convention

ALL out for the Toronto, Ont., annual meeting of the National Crushed Stone Association, February 8, 9, 10. A splendid program and entertainment is promised. Every crushed-stone man in North America is invited.

A. P. SANDLES,
Secretary, National Crushed Stone Association.

siderations, however, from the standpoint of contractors who have invested heavily in road building, are the following factors that no prospective bidder can safely neglect:

1. Supply of labor and materials.
2. Transportation service.
3. The economic principle of suppressing public works in time of business expansion or prosperity.
4. The probable volume of private construction.

The first two of these factors are old acquaintances, but their connection with economic principles and private construction will bear close scrutiny from now until June. Judging from this year's ex-

Missouri Valley Sand and Gravel Producers Association

Review of 1920 and Prospects for 1921

ENTHUSIASM, co-operation, good-fellowship and industry marked the second annual meeting of the Missouri Valley Sand and Gravel Producers Association, held at the Muhlbach Hotel, Kansas City, Mo., on December 16 and 17. It was considered by all the members to be a most satisfactory meeting, one to be remembered for good cheer and good-fellowship, but last and not least, one where an exchange of much valuable experience and information took place.

In his opening address, President John Prince reviewed the year's business. He summarized the acts of the Interstate Commerce Commission and their effect upon sand and gravel producers. He pointed out that in his statement to the Calder Committee (Rock Products, Dec. 4) certain specific changes were necessary in the Esch-Cummins railway law. He said sand and gravel producers were now passing through a temporary period of business depression, which must soon change for the better.

As the association is made up of districts, viz.: Lower Kaw River, Upper Kaw River, Missouri River, Arkansas River and Oklahoma, a report of conditions in each district was called for. It developed that conditions in all districts are about the same. The loss suffered by the farmers in that section of the country, amounting to about \$440,000,000, because of failure to sell crops may seriously curtail sand and gravel production, inasmuch as the farmers have voted against all road building. Then again, the recent cement shortage and high cost of building materials have also seriously affected sand and gravel production, let alone car shortage and priorities.

In a discussion on freight rates, here as well as at other meetings, it was again brought out that the freight rates on sand and gravel are now all out of proportion to the value of the commodity. Mr. Prince suggested the employment of a man well versed in traffic matters as assistant to the secretary of the association. An assistant of such a nature would be able to help the producers collectively and individually, and thereby help keep transportation problems somewhat clear, he said.

V. O. Johnston, president of the National Association of Sand and Gravel Producers, addressed the association on the value and functions of an organiza-

tion. He summarized the acts of the Interstate Commerce Commission and the resulting economic conditions of the country. A strong point brought out by Mr. Johnston was the need of a better and more complete cost-keeping system for sand and gravel producers. He also urged that all sand and gravel producers write to their senators and congressmen in favor of repealing the objectionable features in the Esch-Cummins railway law, namely, that of vesting in the Interstate Commerce Commission the power of discrimination between shippers.

Why Keep Accounts?

W. E. Koch, educational director of Irving-Pitt Mfg. Co., Kansas City, Mo., addressed the association on "Why Keep Accounts?" This talk was very interesting, as well as instructive, and Mr. Koch's manner and personality gained the admiration of all present. He brought out clearly that in order to completely know the real condition of business, the trend of business, proper financing of business and improvement of credit, it was necessary to keep accounts. Adequate records, he said, are the blue-prints of business, enabling companies to analyze their business, to locate leaks and losses and to stop them.

Mutual Insurance Plan Discussed

H. F. Niebling, of the Kansas City Bar, addressed the association on "Possibilities of Mutual Insurance on Floating Equipment" and the formation of such a company as will take care of marine insurance to be fostered by the association. After some discussion the matter was left open for further consideration.

New Officers

John Prince, president of the Stewart Sand Co., Kansas City, Mo., was unanimously re-elected president of the association; H. A. Von Unworth, Yuhola Sand Co., Muskogee, Okla., was elected vice-president, and Frank Peck of the Muncie Sand Co., Kansas City, Mo., was elected treasurer.

The new executive committee consisting of one member from each district is as follows: Missouri River District, Harry Moore, Missouri River Sand & Gravel Co., Booneville, Mo.; District of the Lower Kaw, C. E. Todd, Kaw River Sand Co., Kansas City, Mo.; District of the Upper Kaw, Norman Wear, Wear

Sand Co., Topeka, Kans.; Arkansas River District, Ray F. Cubbon, Jackson-Walker Coal & Mining Co., Wichita, Kans.; Oklahoma District, J. M. Chandler, Price Sand Co., Tulsa, Okla. F. A. Laughhead remains as secretary of the association.

Informal Dinner

An informal dinner, followed by a theater party, was held on December 16 at the Muhlbach Hotel. This was attended by both members of the association and their ladies as guests of the Stewart Sand Co., Kaw River Sand Co. and Muncie Sand Co., of Kansas City.

What the Railways Have Done Since March, 1920

THOMAS DE WITT CUYLER, chairman of the Association of Railway Executives, in a statement issued in New York City, December 26, defended the 1920 record of the railways as follows:

1. Increased the average movement per freight car per day 6.3 miles—from 22.3 to 28.6 miles.
2. Increased the average load per car 1.7 tons—from 28.3 to 30 tons.
3. Made substantial reduction in the number of unserviceable locomotives.
4. Reduced the accumulation of loaded but unmoved freight cars from 103,237 on March 1, to 21,991 on December 3, of which only 6386 were detained because of the inability of the railroads to move them.
5. Relocated approximately 180,000 box cars from the East to the West for the movement of farm produce.
6. Relocated approximately 180,000 open top cars from the West to the East to keep up the production of coal.
7. Moved the third highest coal production in the history of the country.
8. Spent over \$500,000,000 extra on improving the maintenance of tracks, bridges, cars and locomotives.
9. Contracted to spend about \$250,000,000, largely out of earnings for additions and betterments to promote the movement of cars.
10. Made arrangements to purchase approximately 50,000 new freight cars, 1500 new locomotives, and 1000 new passenger cars.
11. Begun the reconstruction of thousands of old cars.
12. Moved—with a deteriorated plant, under disturbed labor and business conditions—the largest volume of traffic ever known in a single year, with the highest efficiency yet achieved, and with a minimum addition to the value of the property on which the public has to pay a return through rates.

To Push Repeal of Certain Sections of Esch-Cummins Law

Business Manager of the National Association of Sand and Gravel Producers Addresses Senator Calder's Committee and Will Camp on the Job Until Congress Acts

AS LONG as the National Association of Sand and Gravel Producers has a cent in its treasury every effort will be made to get action on the recommendations of Senator Calder's Committee of the United States Senate on Reconstruction and Production referring to the revision of the Esch-Cummins law by removing the power of Interstate Commerce Commission to discriminate between users of open-top cars.

Hardly had Senator Calder's report been issued when E. Guy Sutton, business manager of the National Association of Sand and Gravel Producers, addressed the Senate committee as follows:

There is no form of building work, whether it is structures or highways, that does not require the use of mineral aggregates in greater or less quantities. In this sense, sand, gravel, crushed stone and slag are basic building materials. Especially is this true of sand, since it is employed as the fine aggregate in making concrete; as a part of the mortar for laying brick, stone and tile; and for plastering. It is essential also in the manufacture of glass and for the molding and finishing of castings.

It is apparent, therefore, that whatever curtails the output and delivery of sand, gravel, crushed stone and slag, in like manner affects the construction industry.

For the past four years the chief factor limiting the production and sale of these materials has been transportation in its two phases—freight rates and car supply.

Freight Rates

In the first place the freight rates applying on sand and gravel are in no case less than, and in many cases are double, the average price asked for these materials at the point of production.

These exorbitant rates greatly limit the market territory, thus decreasing the output of individual plants. At the same time, the excessive rates encourage the installation of small units of operation, with a consequent increase in cost of production and additional expense in handling by the railroads.

The Interstate Commerce Commission, in its report in ex parte 74, called attention to the maladjustment of sand, gravel, rock and slag rates, and to the intention expressed by the carriers, by their testimony in the case, to readjust rates where hardships result from the general percentage increases.

While it is true that the carriers thus far have taken no action toward the readjustment of sand and gravel rates, yet it may be safely assumed that the ques-

tion will be taken care of either by voluntary action on the part of the railroad officials or through suitable proceedings instituted by the shippers interested. So we may conclude that this handicap to the healthy growth of the sand and gravel industry will eventually be removed.

Car Supply

The second element of transportation which has reacted disadvantageously to the normal movement of sand, gravel and other mineral aggregates, is the matter of car supply. These commodities, with very few exceptions, are shipped in open-top cars. The manner of production does not permit the use of cars of other types without greatly increased expense in loading



E. Guy Sutton

and unloading. Open-top cars, as is well known, are also employed for the shipment of coal, iron ore, steel products, lumber and other building materials.

Now, if open-top cars are distributed preferentially for the loading of any one of these commodities, it naturally follows that the other shippers requiring this class of equipment will suffer unjust and unreasonable hardship, which will extend on down the line through the manufacturer or the contractor to the ultimate consumer. It therefore is manifest that in times of peace, and even during a period of an actual and well-defined na-

tional calamity, priorities are fundamentally wrong in principle. In practice, too, priorities invariably create conditions which are worse than those they would correct.

Furthermore, it is obvious from past and recent experience that priorities and preferential car supply lead to insidious corruption, favoritism, the granting of special privilege, to unjust discrimination, and to profiteering in the sale of human necessities, all of which are contrary to the enjoyment of equal rights guaranteed by the Constitution to all citizens of the United States, and recognized the world over as the basic American principle.

Your committee is familiar with the fact that certain portions of the Interstate Commerce Act as amended gives broad and general powers to the Interstate Commerce Commission with respect to car service. Especially do we refer to Section 1, Paragraph 15, which permits the Interstate Commerce Commission with or without complaint; with or without notice, hearing or making or filing a report, to declare an emergency and in virtue thereof to take charge of transportation in time of peace and thus absolutely control the business of the country without regard to the inherent property rights or commercial pursuits of any individual or corporation.

This same provision of the law (Section 1, Paragraph 15), makes it possible for the Interstate Commerce Commission to relieve the railroads from all responsibility to the shipping public. Just so long as the railroads under this feature of the act may be made safe from legal action when they fail to provide adequate transportation facilities for all shippers, just so long will they defer the purchase and repair of equipment; the enlargement of their terminals; the improvement and extension of their tracks, and the establishment and maintenance of efficient methods of operation.

In view of these objectionable features of the law which we have pointed out, and because of the disastrous effect the application of these provisions has had and will continue to have on the construction industry, if not corrected, we strongly urge that your committee recommend that the act to regulate commerce be amended by striking out all of that part of Paragraph 15, Section 1, which grants authority for preference and priority in transportation, with the possible exception of that portion which reads as follows:

In time of war or threatened war, the President may certify to the Commission that it is essential to the national defense and security that certain traffic shall have preference or priority in transportation, and the Commission shall, under the power herein conferred, direct that such preference or priority be afforded.

Interstate Commerce Commission and Rates on Gravel, Sand, Stone

To Collect Statistics Which Will Show Freight Revenues Earned by Railways from This Traffic

By Francis B. James* Commerce Counsel,
Washington, D. C.

THE INTERSTATE COMMERCE COMMISSION has revised its regulations as to requiring carriers engaged in interstate commerce to report freight commodity statistics of Class I roads. Class I roads are those having an annual operating revenue above \$1,000,000.

Five grand divisions of commodities are prescribed as follows: Products of Agriculture; Products of Animals; Products of Mines; Products of Forests; and Manufactures and Miscellaneous. These are subdivided into seventy distinct classes. Class 35 is entitled "Clay, Gravel, Sand and Stone."

Said Class 35 embraces the following:

Blocks, Paving Stone	Stone Screenings
Brick Dust	Magnesite
Cherts	Marble
China, Clay	Marble Chips
Chips, Marble	Marble Dust
Clay	Marble Slabs
Clay, China	Molders' Sand
Clay, Pipe	Mud, Rumbler
Crushed Rock or	Onyx
Stone	Paving Blocks, Stone
Curbing, Stone	Pebbles
Dolomite	Pipe, Clay
Dust, Brick	Rip Rap
Dust, Marble	Rock
Earth, N. O. I. B. N.	Rock, Crushed
Earth, Fullers	Rock, Lime
Earth, Infusorial	Rock Screenings
Emery	Roofing, Slate
Facings, Stone	Rubble Stone
Fire Clay	Sand
Flagging, Stone	Screenings, Stone
Flint Pebbles	Shale
Fullers' Earth	Silica
Ganister	Slabs, Marble
Granite	Slabs, Stone
Gravel	Slate
Grout	Slate, Roofing
Gypsum, Crude	Soapstone
Gypsum, Powdered	Spar, Stone
Infusorial Earth	Stone, N. O. I. B. N.
Jasper Stone	Stone, Crushed
Kaolin	Stone, Curbing
Lime Rock	Stone, Facing
Limestone	Stone, Flagging
Loom	Stone, Lime
Stone Paving Blocks	Talc

Information is required from each carrier as to each of said seventy classes as to the number of carloads and the number of net tons of freight of 2,000 pounds as follows: (1) revenue freight originating on the carrier; and (2) total revenue freight carried.

The Interstate Commerce Commission makes a summary of this information quarterly and each calendar year as to the United States as a whole, and separately as to the Eastern District, Pocahontas District, Southern District and Western District.

This new classification by the Inter-

* Mr. James is the special counsel retained by the National Association of Sand and Gravel Producers.

state Commerce Commission and the summaries made by that body will be of some value in ascertaining whether any particular commodity is or is not bearing its fair proportion of the transportation burden and in presenting matters of rates to freight rate committees of carriers and in preparing for the hearing of formal complaints before the Interstate Commerce Commission.

As all commodities are thus grouped into but 70 classes it is difficult to have each class strictly homogeneous. Some doubt may well be entertained as whether "clay" should be properly included in Class 35. This classification, however, is subject to revision by the Interstate Commerce Commission, and the industries involved may well give the subject thoughtful consideration and make needful suggestions.

Sand and Gravel Convention

THE ANNUAL CONVENTION of the National Association of Sand and Gravel Producers will be held at the Seelbach Hotel, Louisville, Ky., January 12, 13 and 14.

A program of unusual interest is in course of preparation and arrangements are being made for special features of entertainment.

There will be a large crowd in attendance. We recommend that you make your hotel reservations without delay.

E. GUY SUTTON,
Business Manager.

The Explosion of a Quarry Man

ROCK PRODUCTS has printed considerable about the advantages of a National Mineral Aggregate Association. Therefore it is only fair to give room to an opinion on the other side. Here it is:

"This 'mineral aggregate' agitation is becoming a tender subject and I believe I voice the sentiment of the majority of the producers when I say we are beginning to resent the continuous fussing and

woodpecker ra-ta-ta-tat of circular letters, personal letters and other kinds of communications from those who are apparently trying to save the industry from itself. We desire very much to be let entirely alone on this subject. We want no association a-la-Wisconsin Mineral Aggregates Association.

"Outside of an occasional problem in common, we see nothing general in common between stone and gravel in a national way. On the other hand, there are many things in common between stone and gravel in a local way and these local problems have been handled and are being handled in a perfectly legitimate, neighborly, friendly and brotherly sort of way. We are getting tired of the Wilsonian idea to act and look like the Sherwin-Williams' paint ad—(cover the earth.) We want to try to forget national associations and the miserable trials and tribulations we were forced into when we made tiresome journeys to Washington under the guise of war necessity to pay tribute to the chairman of some committee or commission. Let us be done with all this bunco stuff and get down to work.

"As long as we insist upon having national associations and national committees, officially designated to go to Washington and there shoot off a lot of 'hot air' and 'bull,' just that long Washington will feel inclined to continue her various war-time committees and policies in order to extend a welcoming hand to our national official representatives when they arrive in Washington, and there entertain our representatives lavishly, grant them every wish and desire asked for and send them home entirely satisfied and happy, the same as they have always done during the past two or three years. You no doubt remember how we were always satisfied and happy when we left Washington."

British Government Starts Big Road-Building Program

NEW ROAD CONSTRUCTION amounting to almost £1,500,000 has been under taken by various British cities in co-operation with the Government as a means of providing work for the unemployed. Details of the plan received from its English Information Service by the Bankers Trust Co., of New York, indicate that the British Ministry of Transport will bear 50 per cent of the cost of such work and will loan to municipalities the remaining amount for five years repayable in annual installments.

Ex-service men receive preference among applicants for employment at the road work, but all applicants are required first to submit to one week's registration at the established Labor Exchanges. This is to eliminate "floating" labor.

The Slate Quarry Industry

Prominent Pennsylvania Slate Producer Analyzes Situation for Rock Products

LABOR SHORTAGE AND CAR SHORTAGE were both limiting features of slate production during 1920. This was especially true of labor shortage during the entire year and of car shortage during the first six months of the year.

Labor conditions are now (Nov. 26) much easier than they have been at any time this year. In fact we are able at this time to get all the men we need without any great difficulty. The car shortage with us is a thing of the past.

Whether wages will be reduced during 1921 will depend on the prices we are able to obtain for our product. I don't look for any considerable lowering of wages. If we are compelled to cut prices in order to move the goods, we shall have to reduce manufacturing costs correspondingly.

We do not think that there will be any reduction in the price of blackboards nor structural slate in order to stimulate business in these lines. The price of roofing slate will be governed somewhat by the price of competitive articles used for the same purpose, and if there are reductions of consequence in articles of merit used in roofing in order to stimulate business, it is possible that roofing slate will have to be reduced correspondingly.

Labor shortage and railway priority orders were the real cause of material shortage so far as our industry is concerned. There is ample plant capacity to take care of all demands if we can secure sufficient trained labor.

Our production in 1920 was practically the same as in 1919 because the conditions with respect to scarcity of labor and railway restrictions were about the same in 1919 as in 1920. Our actual production this year will be about sixty per cent of the capacity of our plant when we can obtain sufficient labor and sufficient market.

We favor the repeal of the control of distribution of coal by the Interstate Commerce Commission because we feel that governmental control of business is and has been much more inefficient than the normal procedure as regulated by business conditions.

We believe that the less interference there is by federal and state governments in construction and all business the better it will be for all concerned.

We have not noticed any material effects on our business by reason of the

increased freight rates other than that it has increased our production costs materially and also increased the cost of our material delivered to our customers largely.

We believe there will be a sufficient market next year for such stocks of our goods as can be accumulated during the winter. We are therefore laying in moderate stocks of slate for next season's demands.

It appears to us that the natural drift of conditions favors a good season in 1921 for the construction industry for the following reasons:

1. There is pressing need of housing facilities and this need is national in its scope.

2. Costs of construction will be materially less in 1921 than they were this year by reason of the drop in prices of many building materials and especially by reason of the greater productiveness of labor now as compared with the recent past.

3. We have observed that a period of great industrial activities such as this country has gone through results in an accumulation of savings which stimulates home building during the period following such industrial activities.

Ben Stone on Winter Business

IN HIS "Weekly Bulletin" to members of the Illinois Sand and Gravel Producers Association, Ben Stone, business manager, says:

"It is of course physically impossible to ship sand, gravel and crushed stone in volume during the winter months; but there are practical ways for tackling the transportation problem that is ever present during the operating season which might well be given consideration by all concerned. It is a matter of history in the industry that business is slack during the first three or four months of the producing season, when, as a rule, cars are plentiful, and that during the latter part of the season, as the coal shipping season advances, the demand for sand, gravel and crushed stone has always been most active. The cause of this condition is that state, county and municipal officials, and builders in general, hold up the making of contracts from year to year until the building season is actually upon us, thus forcing into four or five months a demand for materials which should and easily could be spread over an eight-months' period by having contracts let during the winter and early spring. Road

construction in Illinois this year furnished an excellent example of the possibilities in this direction. In 1919 contracts were let for about 600 miles of work and at the close of the season it was found that approximately 450 miles would be carried over. In 1920 almost 400 miles of roads have been built and the only thing which made the completion of this large mileage possible was that contractors, with work in hand, were able to provide materials and make every preparation to go right ahead with their work as soon as weather conditions would permit.

"It is even more remarkable when we are reminded of the exceedingly unfavorable transportation conditions that have existed throughout the past year. We have recently called this matter to the attention of some of the railroads, suggesting that they might institute a campaign through their traffic departments to have construction contracts let earlier, and we have also endeavored to interest representatives of other construction material producers; but it should not be allowed to rest at that. The slogan of the entire construction industry should be: **"LET CONTRACTS NOW."** It requires only a minute's reflection to estimate the tremendous economic saving that would result, and it is an avenue through which we believe the greatest amount of relief can be had in the present situation."

Long-Haul Molding Sand Rate Held O. K.

DISMISSAL of the complaint is recommended by Attorney-Examiner Arthur R. Mackley in a tentative report in No. 11503, Rock Products Traffic League vs. Chicago, Burlington & Quincy et al., on a proposed finding that a rate of \$3.70 per net ton on molding sand from Ottawa, Ill., to Chattanooga, Tenn., was not unreasonable or unduly prejudicial. The complainant attacked the rate on the ground that it exceeded a rate of \$3.20 from Ottawa to Pittsburgh, Pa.; Buffalo, N. Y., and other points in the same rate group. The shipments involved moved in the period from August 1, 1918, to May 29, 1920.

"The complaint seems to rest largely on the proposition that the conditions of transportation from Ottawa to Chattanooga are substantially similar to those from Ottawa to Cleveland, Buffalo and other points in the same general territory north of the Ohio River, and that the ton-mile yield to these points appropriately decreased with the increased distance would therefore represent a fair measure of the rate to Chattanooga," the report says. "The record does not warrant a finding to that effect. Upon all the facts the complaint should be dismissed."—"Traffic World."



General Market News



Movies to Teach Highway Transportation

NEW YORK CITY.—Moving pictures will be used liberally to teach highway transportation at the coming Highway Transportation Show to be held January 3 to 8, 1921, by the Motor Truck Association of America at the 12th Regiment Armory, 62nd Street and Columbus Avenue, and the First Field Artillery Armory, 68th Street and Broadway. There is nothing which so effectively gets home its lesson as the motion picture; and it was this fact which led the Show Committee to gather together the greatest array of highway transportation films ever before collected for continuous showing at any one exhibition.

Highway transportation, while the newest form of transport as compared with the railway and the waterway, has many important phases, both for the concerns which "ship by truck," as well as for the companies which operate the truck equipment. Yet all of these phases will be adequately covered in the films to be run during Show Week. There will be films for the average business man who makes use of trucks to bring in raw products or make final deliveries, as well as for the man who owns, operates and maintains the trucks.

Good roads are necessary for the economic development of the country as well as for the efficient operation of motor vehicles; and this phase of highway transportation will be adequately covered in several films. These will not only treat of road widths, surfaces, foundations and sub-soil investigations, but also of the great business-building advantages of proper highways to carry on the commerce of bringing in food products from the agricultural areas to the cities, and of taking finished manufactured products from the cities to the farming territories. The cause of road wear upon which legislatures in all states should base their charges for truck registration fees, will be shown graphically in a film of jumping trucks. A special feature of this film is a slow-moving section which shows just exactly what happens to the truck tires, springs, frame, body and load, when a truck traveling at high speed hits an obstruction and rebounds on the level road. This film also points out clearly the important relation between road impact as caused by the sprung and unsprung weight of the truck.

There will be many films for the truck operator and maintenance superintendent. Foremost among these will be one showing the complete chassis and engine

lubrication by means of animated sectional views through the different truck parts. The care, repair and adjustment of truck parts, such as engines, clutches, gearsets and different types of rear axles, will also be shown. These will be of great value to the truck owner and maintenance man—in that they will depict the latest and most approved methods of repair, and thereby aid in helping to reduce truck maintenance costs.

Tires, one of the greatest single items of expense entering into the cost of truck operation, will also be included in the large moving picture program to be presented. Films showing the abuses to which pneumatic and solid tires are put, and the methods of overcoming such abuses will also be run. Foremost among these educational tire films are two entitled, "Shoeing the Horse of Progress," and "Blowout Bill's Busted Romance."

Some Farmers Against Further Road Improvement

THE ROCK PRODUCTS industry about Indianapolis, Ind., is considerably interested in the recent action of the Farmers' Federation of Marion County, Indiana, in asking that the Board of County Commissioners let no more contracts for road improvements in the county for the next two years, alleging that the cost of materials and the resultant effect on taxes in the county from the building of roads with costly materials is working a hardship on the farmers.

A letter signed by a committee of seven members of the Farmers' Federation was received by the Board of Commissioners, but it did not seem to receive a favorable reception by the board. No comment was made save a remark by Joseph G. Hayes, one of the members of the board, who said that one member of the Federation Committee "has had good roads built past his own property and now he doesn't want others to get roads."

The commissioners last week signed a contract for one road improvement which will cost the county about \$300,000, although work on it will not be started until next spring.

Business Readjusting Itself Without Any Prospect of a Panic

WASHINGTON, D. C.—With no prospect of a financial panic in sight, the post-war re-adjustment of business, about which the country has been speculating for two years, is finally at hand, according to Archer Wall Douglas, chairman of the committee on statistics of the

United States Chamber of Commerce, in a review of business conditions throughout the country. The course of prices will continue downward, it is declared, and by January 1 merchandise stocks will be smaller than for many years.

"We are over the top and on the down grade in most phases of commercial and industrial life," says the report, "although there still continue to be a few exceptions to this general statement. Demand in all lines is slackening. It is everywhere a case of most conservative buying rather than any great increase in supply. We are having a vivid illustration of how our usual volume of business is made up largely of things people do not really need. Also, we see how people will get along without things they once thought indispensable, once the fit of economy is on them.

"Manufacturing is meeting the situation in the usual fashion, by running on reduced time or shutting down altogether. This has already meant, in some cases, reduced wages. Just now the need of the country seems to be for more consumption rather than more production.

"Talk of stabilizing prices, so as to save the situation, no longer interests any one save a few hopeless theorists. The laws of supply and demand will, in time, regulate matters.

"The entire business world is steadily trending to that readjustment which we have talked about so long. We have been through it before, several times, and we will go through it again, and successfully. This time it is robbed of its greatest terror, financial panic and ensuing disaster.

"Theories of great and startling changes in the framework and organization of manufacturing life are dying out in view of the exigencies of the occasion as to how to maintain adequate production at reasonably remunerative prices. Industrial life, in time, will doubtless be more democratized than at present, but we are not headed in the direction of running factories by committees.

"The entire commercial world is setting its house in order by reducing commitments, collecting outstanding accounts, and bringing down stocks of merchandise to the requirements of reduced demand. And it is all being done soberly and advisedly. All are awaiting that psychological time, the first of the year, when the current of events and the general trend will be more readily discerned and more easily interpreted. Meanwhile, much definite action is being postponed. Merchandise stocks in general will then be far less than for several years."

Development in Wet Process Portland Cement Plants--I

Bessemer Limestone and Cement Company, Bessemer, Pennsylvania, Erects Plant That Typifies 1920 Progress—Some Entirely New Ideas and Methods

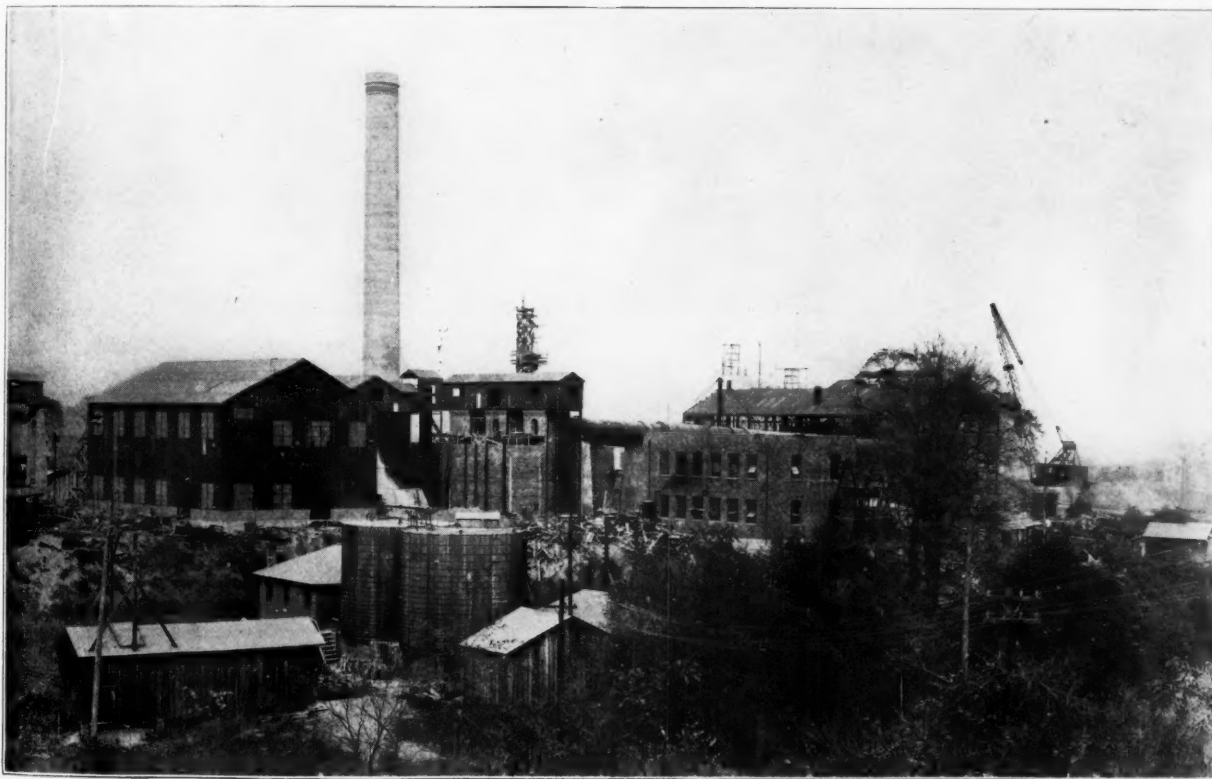
ONE OF THE MOST IMPORTANT developments in the Portland cement industry during the year 1920 was the erection of the new plant of the Bessemer Limestone & Cement Co., at Bessemer, Pa., and its entrance into the field of producers. This plant represents the experience of the engineers of the Bessemer Limestone & Cement Co., under the supervision of F. R. Kanengeiser, vice-president and general manager of the company, whose slogan throughout was *simplicity and facilities for continuous operation*. Mr. Kanengeiser, who is a former steel plant engineer, was not bound by any of the prejudices of cement men, and in the embodiment of his views he has constructed a cement plant that has some really novel features.

In carrying out his ideas he had the assistance of the engineering staff of the Allis-Chalmers Manufacturing Co., which furnished much of the equipment, and of

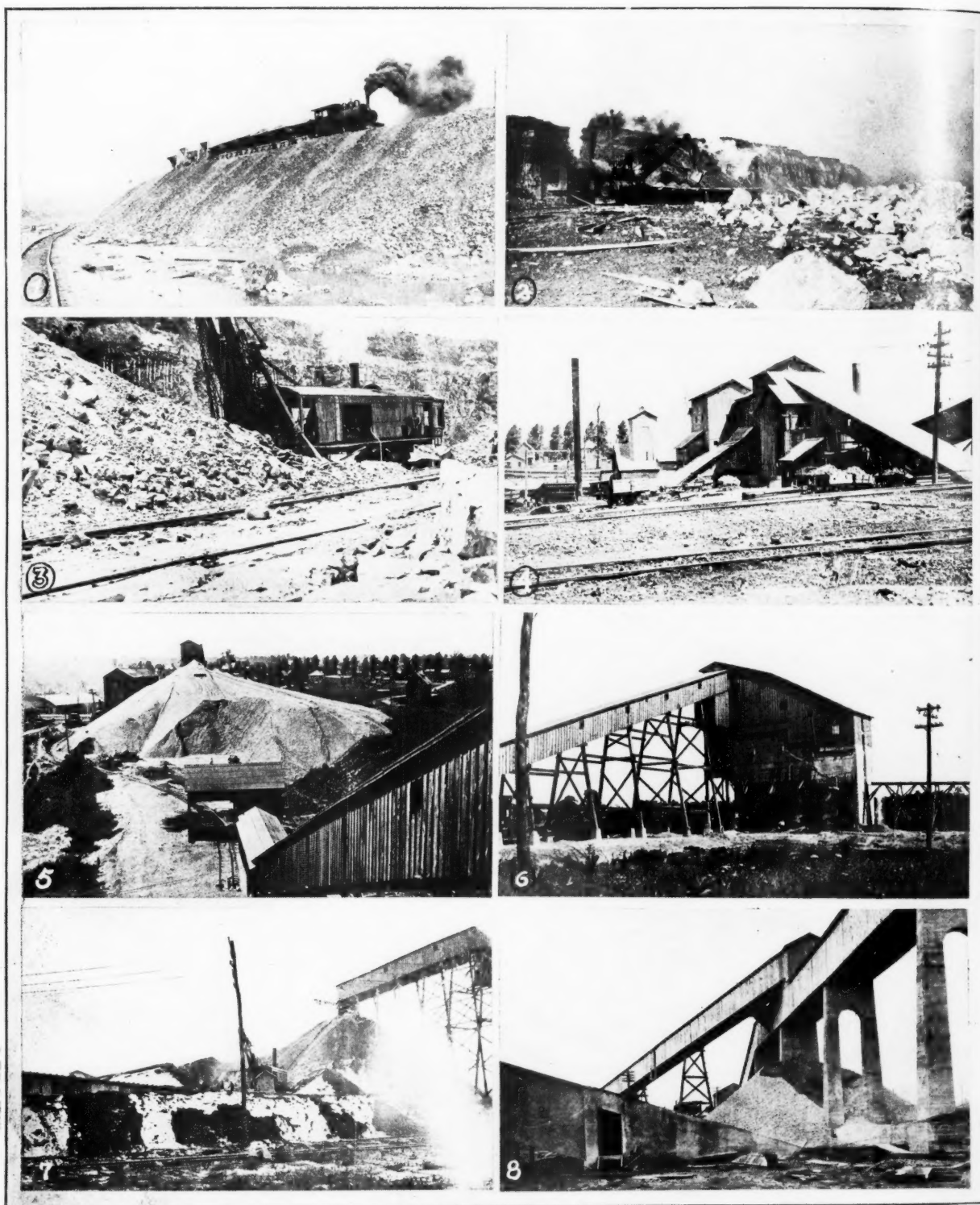


Charles Schmutz, an experienced cement man. Mr. Schmutz was formerly sales manager of the Crescent Portland Cement Co. His advice was of inestimable value to the Bessemer Limestone & Cement Co., and he had entire charge of purchases, together with the expediting of shipments, throughout the entire construction of this cement plant. Many of his ideas have been embodied in the designing of this plant, according to Mr. Kanengeiser.

The Bessemer Limestone & Cement Co. is one of the most progressive companies in the rock products industry. Situated, as it is, a distance of only 13 miles from Youngstown, Ohio, a great steel center, it does a great fluxing stone business of about 700,000 tons annually. In the production of so great a tonnage of stone considerable waste was encountered in the fines, and in order to utilize this the company erected a modern agri-



General view of cement plant, Bessemer Limestone and Cement Co., Bessemer, Pa. Above—F. R. Kanengeiser, vice-president and general manager



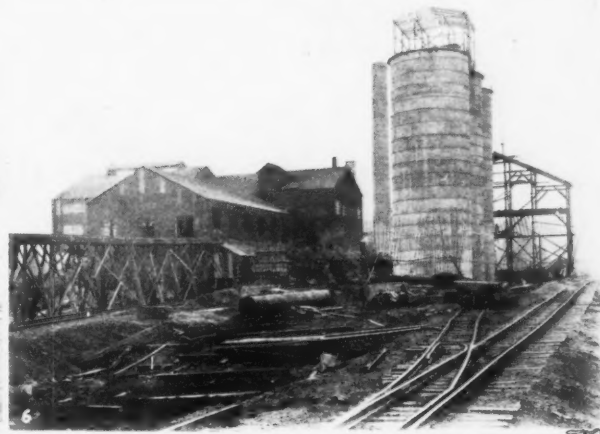
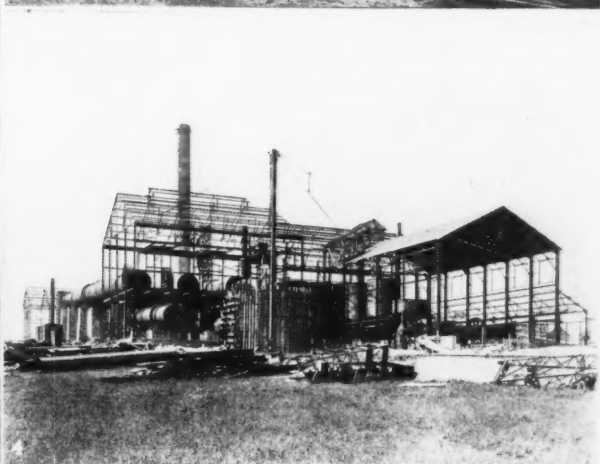
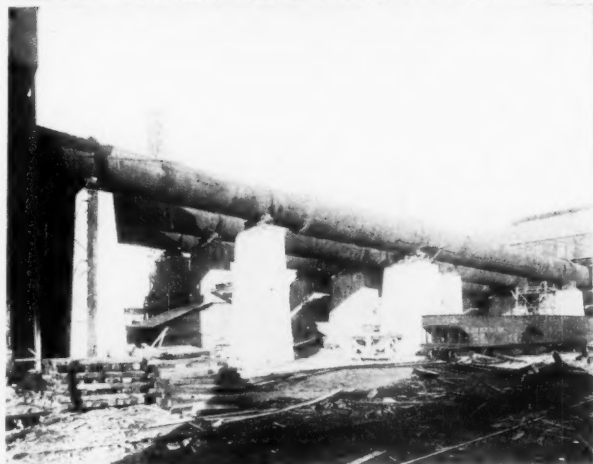
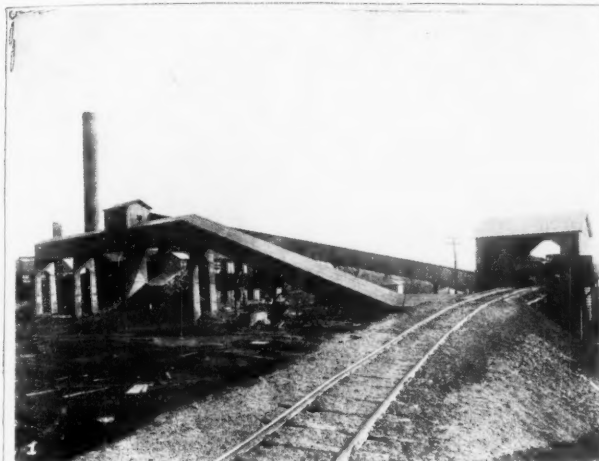
(1) Dumping overburden; (2) Shale and clay deposit; (3) Steam shovel in limestone quarry stripping shale overburden; (4) Crushing plant; (5) and (6) Washing plant described in Rock Products April 10, 1920; (7) Screenings used as raw material for cement plant; (8) Limestone and shale storage at cement plant

cultural limestone plant, producing about 50,000 tons of agricultural limestone yearly. Besides the products mentioned above, the company also produces about 100,000 tons of road stone yearly, and in this capacity it utilizes a modern washing

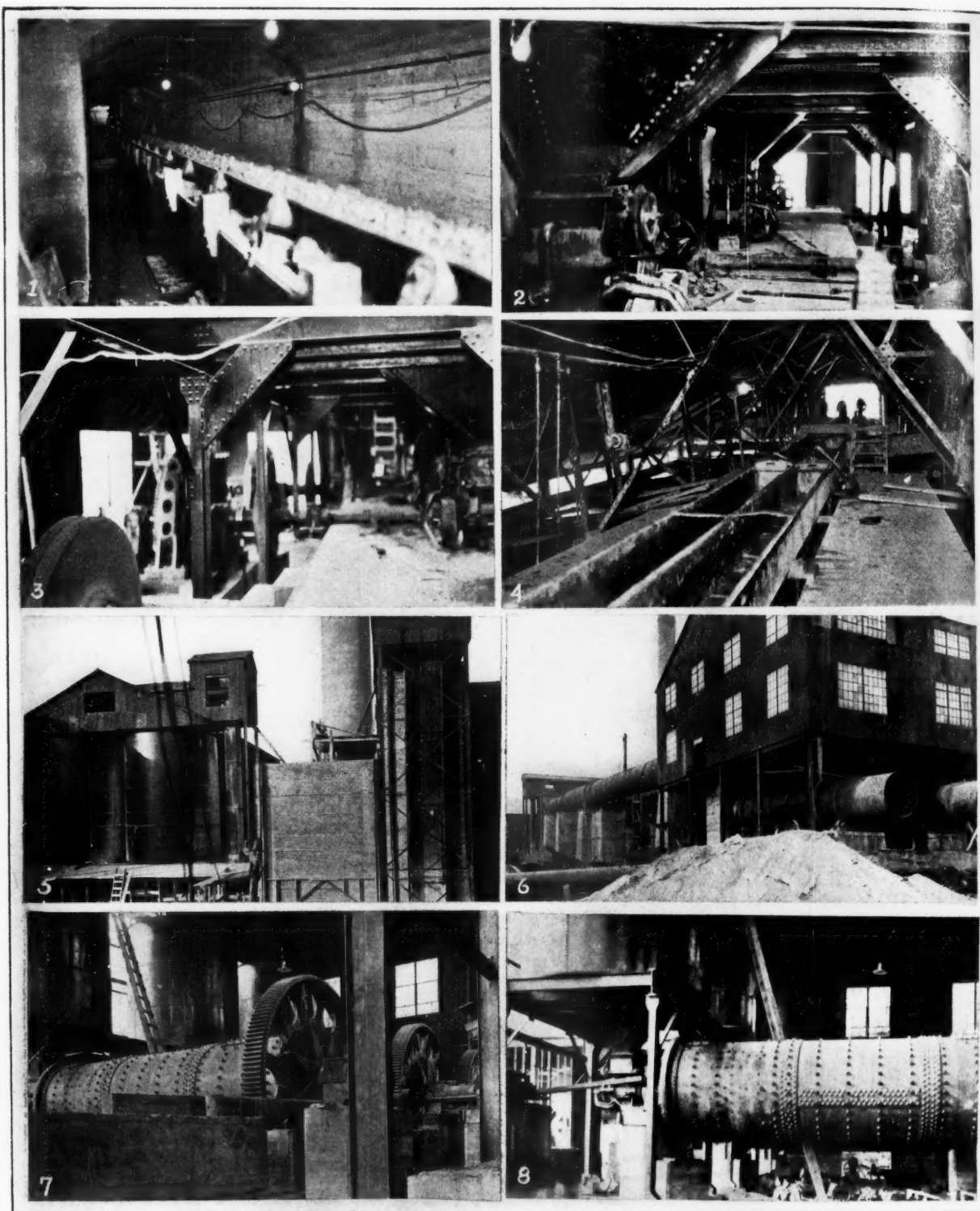
plant already described in a previous issue of **Rock Products**.

As a result of the enormous tonnage of stone produced by this company yearly, even though a good percentage is utilized in the manufacture of agricultural lime-

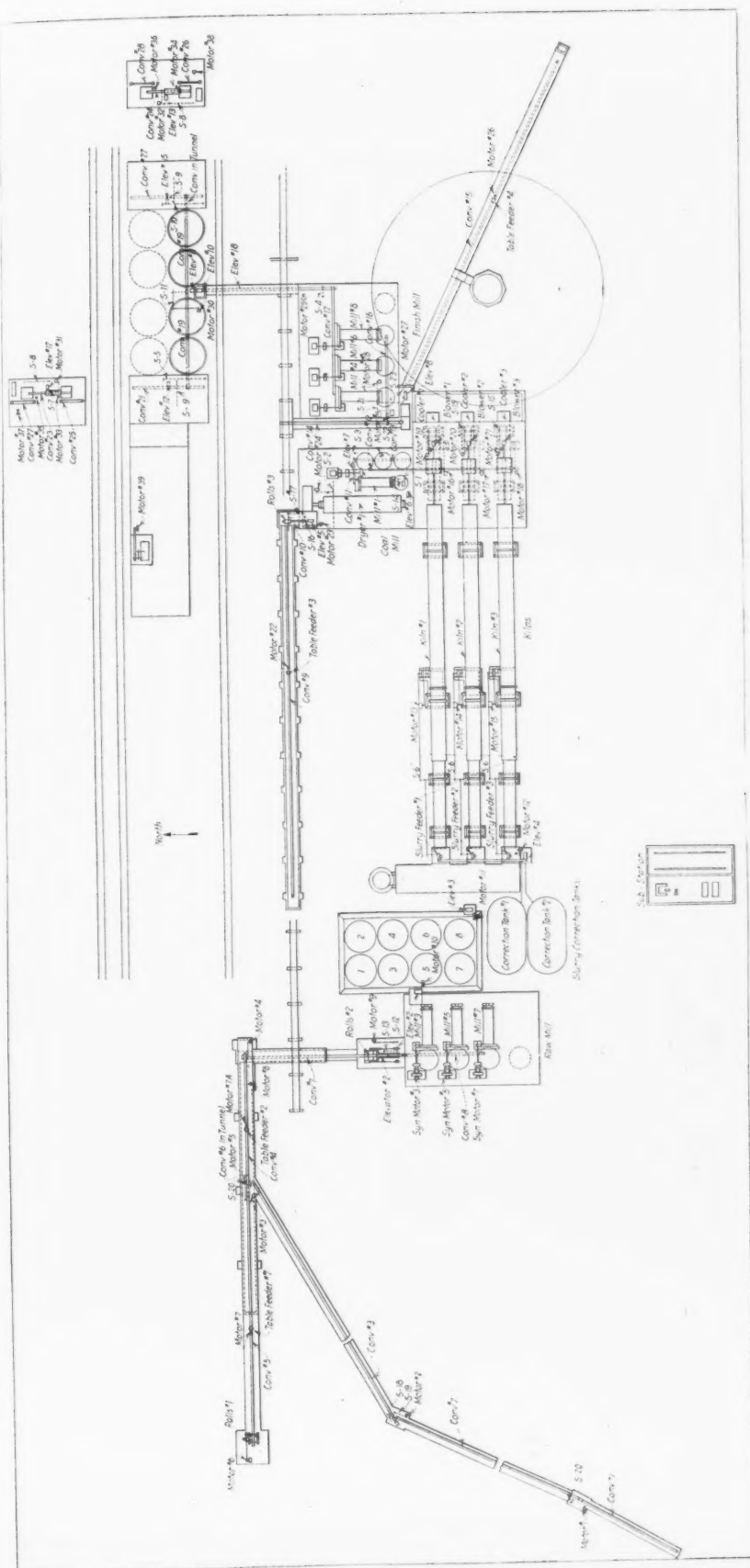
stone, a mammoth pile of screenings, ranging from 60,000 to 100,000 tons, has accumulated in a dump. This was regarded as a loss, as it could not be utilized. The new cement plant will utilize even this waste material, as well as the



(1) Shale trestle and conveyors to raw storage; (2) Raw mill; (3) Kilns on concrete piers; (4) Construction view showing kiln coolers and finish mill; (5) Terry crane for recovering clinker; (6) Silos for storage of finished cement—Packing house under construction



(1) Belt conveyor in tunnel receiving raw materials; (2) Special feeders for compeb mills; (3) Synchronous motor and magnetic clutch drive for compeb mills; (4) Distributing pans over slurry tanks; (5) Slurry tanks and elevator to feed end of kilns; (6) Kilns and coolers; (7) and (8) Compeb mills at finish end



General Layout of Plant

ELEVATORS

- No. 1—18x9x12-in. crusher type.
- No. 2, 3, 4—18x10-in. slurry elev.
- No. 5, 6, 7—10x6-in. vertical elev.
- No. 8, 9—10x6-in. vertical elev.
- No. 10, 11, 12, 13—14x7-in. vertical elev.

CONVEYORS

- No. 1-9, 15, 16—20-in. belt.
- No. 10—16-in. belt.
- No. 11, 12, 13—12-in. R. H. screw.
- No. 14—12-in. belt.
- No. 17, 18—14-in. L. H. screw.
- No. 19—14-in. R. H. and 1 1/4-in. L. H. screw.
- No. 20—16-in. L. H. screw.
- No. 21, 22, 23, 24—R. and L. H. screw.
- No. 25, 26, 27, 28—30-in. belt.

MILLS

- No. 1—No. 622 coal mill.
- No. 3, 5, 7—No. 726 (wet) raw mill.
- No. 4, 6, 8—No. 726 (dry) finish mill.

ROLLS

- No. 1—24x36-in. clay.
- No. 2—42x16-in. stone.
- No. 3—24x24-in. coal.

TABLE FEEDERS

- No. 1—Clay.
- No. 2—Rock.
- No. 3—Coal.
- No. 4—Clinker.

MOTORS

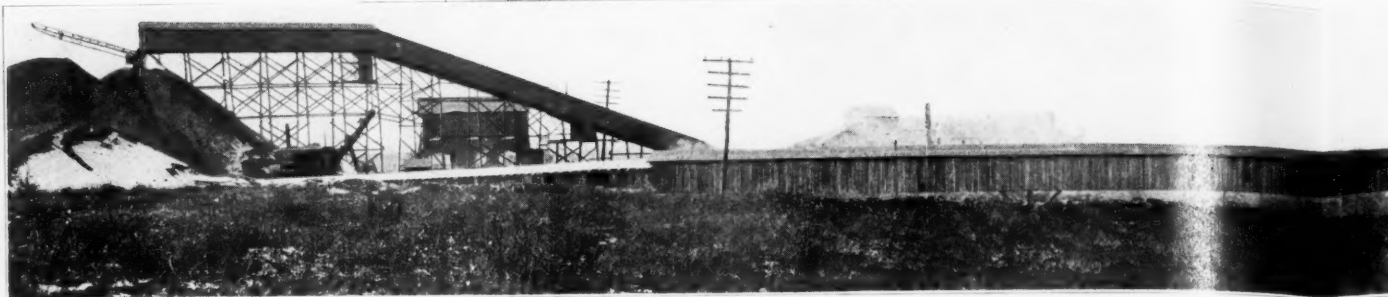
- No. 6, 13, 14, 15, 16, 17, 18, 23, 24—Slip-ring type.
- No. 1-5, 7-12, 19-22, 39—1-60 H.P.
- Note: Motors 10-H.P. and smaller 220 vlt; 20-H.P. and larger 2200 vlt.
- S-1 to S-23—Shafting.

History of the Bessemer Company

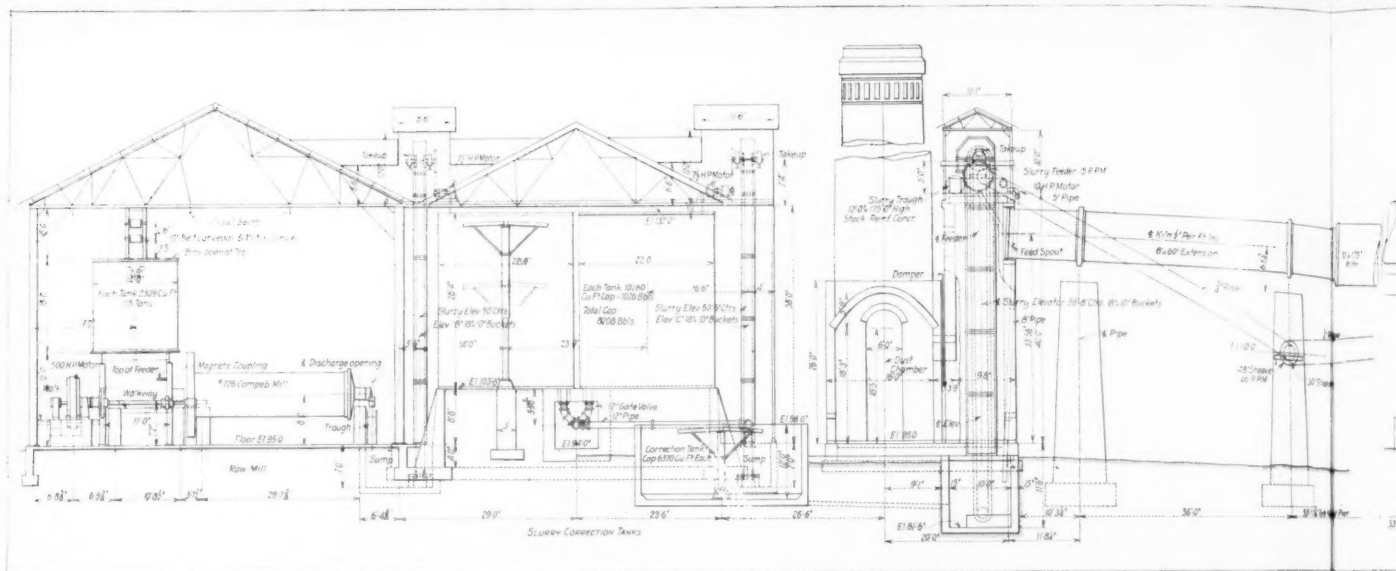
The company, the beginning of which dates back to 1886, was originally known as the Bessemer Limestone Co., but on January 1, 1920, it became officially known as the Bessemer Limestone & Cement Co. This company was formerly a West Virginia corporation, then a Pennsylvania, and now an Ohio corporation. It is incorporated for \$3,000,000 and the cement plant represents an approximate cost of \$1,500,000. This company was the original manufacturer of the famous Bessemer paving brick, being the third largest brick manufacturer in the United States, besides having the largest single unit brick plant in the world. The brick plants, of which there are two, were built to take care of the overburden in the quarry, which consisted of shale and clay, but in 1917 the brick plants were sold to the Metropolitan Brick Co., of Canton, Ohio. About 1200 to 1400 tons of this overburden is used daily for the manufacture of brick.

Record in Construction

Actual construction on the cement plant started in March, 1920, and today this plant is in actual operation, although clinker was being turned out at the time of this writer's visit (November). This

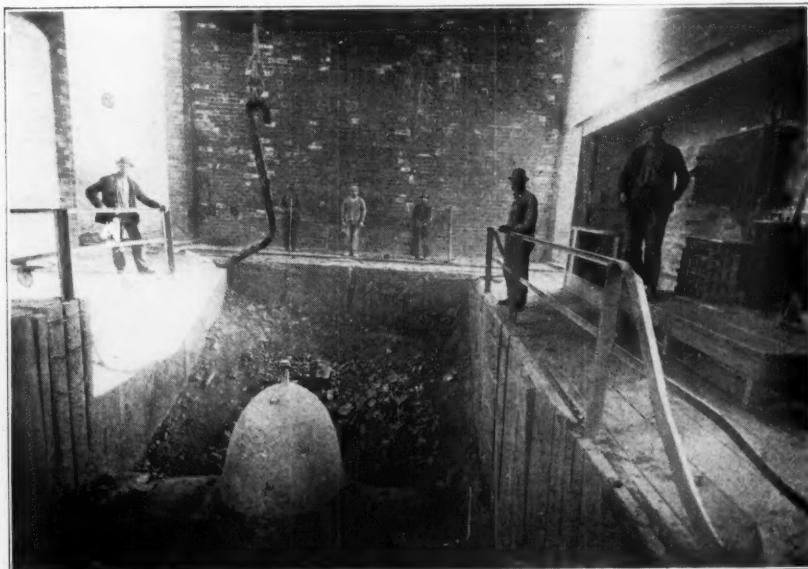


Panoramic view showing complete belt conveyor from



Sectional drawing showing saw mill, slurry

Further drawings showing plans, elevations and o
sum and clinker handling will be published in Janu



Initial gyratory crusher at crushing plant. Note motor control apparatus. Since this view was taken the old crusher house has been remodeled to accommodate an automatic dumper for remote controlled quarry cars



Trestle for unloading coal and slum-Tu
Coal mill in backgrou

in itself is a remarkable record for construction when one stops to consider the difficulties encountered in obtaining and shipping construction materials and equipment during that period. The entire plant is built of concrete and steel, being fireproof in every possible manner, and the remarkable record made in construction is largely due to the efforts of R. J. Hawn, who is both superintendent of construction and of the cement plant operation.

Raw Materials

It has already been stated that the cement plant will primarily utilize the waste screenings, but since the plant has a rated capacity of 1,000,000 bbls. of cement yearly, it will require about 250,000 tons of stone. Approximately one-fourth will therefore be furnished from the screenings and the rest will have to come direct from the crushing plant. Undoubtedly the company will discontinue eventually the manufacture of road stone to meet the cement requirements.

The company owns quarry land in Bessemer, Pa., containing approximately 65,000,000 tons of stone. The other necessary ingredients, shale and clay, are found in the overburden on the limestone, and together with the limestone form the proper chemical combination of calcium silicates and calcium aluminates, of which cement is manufactured.

Raw-Material Handling

The limestone and shale deposits are located in close proximity to the plant. The company operates five separate quarries, there being approximately a face of 22 ft. of limestone, with a 35-ft. face of overburden consisting of shale and clay. The shale is worked on one bench and the limestone on another.

Well drills are used for blast holing, cutting a hole of 5½ in. The company uses four drills, all being electrically driven. The holes are then charged with 40 per cent dynamite and detonated by means of electric exploders. The larger blasted stone has to go through a second blasting so as to make it suitable for handling with steam shovels. Block-holing with the use of "jackhammers" or air drills, and a light charge of ⅛ to ½ lb. of 40 per cent dynamite is resorted to in breaking up the rock for shovel handling.

For stripping the overburden and loading the rock into cars, nine steam shovels ranging in size from a 100-ton to a 76-ton are used. The 100-ton shovels are equipped with Westinghouse locomotive air-compressors, which furnish air for two "jackhammers," provided for each shovel crew. The rock is then loaded into 12-yd. side-dump cars, which are hauled to the crusher by either direct drive locomotives, Heisler-gauged narrow gauge locomotives or by electric cars operated by remote switch control (Woodford system). The

shale and clay are hauled to the brick plants or to the cement plant in the same manner as the rock.

Crushing Plant

The rock is dumped from the cars into a No. 24 gyratory crusher for initial breaking. This is part of the old crushed-stone plant. The crusher is belt-driven from a 200-h.p. motor. In the crusher house above the crusher is a 60-ton traveling electric crane which is used for handling parts on the crusher, and work of a similar nature. The crusher discharges to a 40-in. belt conveyor of 150 ft. centers, which, in turn, discharges into two rotary screens, 4 ft. x 12 ft. each. The stone averaging 7 in. in size is chuted direct to a bin, and is sold for fluxing purposes, while the oversize goes to two gyratory crushers, No. 7½ and No. 8, respectively. The stone under 2-in. goes to a belt conveyor, 24-in. wide and of 350-ft. centers, which takes it direct to a storage pile. The conveyor belt trestle is illustrated in one of the accompanying views. The stone from the No. 7½ and No. 8 gyratory crushers is the road stone, with the oversize chuted to a No. 4 gyratory which recrushes the stone for the agricultural limestone plant.

Reclaiming Waste Material to Stone Storage

For reclaiming the screenings in the dump pile for conveying to stone storage a tunnel was built underneath the pile, being 258 ft. 6 in. long on a slight incline. The material from the pile falls into the tunnel through 10-in. openings. The tunnel is built entirely of concrete, and contains the first section of belt conveyor, 20 in. wide and 500 ft. long. The 10-in. intakes are spaced at 4-ft. centers at the top of the tunnel. A traveling chute is provided over the belt conveyor, and it can be placed at any one hole desired. Most of the material flows into the open-

ings in the tunnel by gravity, while the rest is handled by locomotive crane and grab bucket.

The first section of conveyor discharges to a second section of belt conveyor, which is 273 ft. long. This section of conveyor crosses the Pennsylvania R. R. tracks and a creek, and it is built of steel, supported by steel piers. The housing is of wood. This section of conveyor then discharges to a third section, which is 471 ft. long, the first 262 ft. being on a 40-ft. incline and the balance on a 12 per cent incline. It then discharges on another short conveyor belt, 88 ft. in length, provided with a 20-in. hand propelled tripper, which discharges the stone into the stone storage, occupying the two eastern bays of the storage trestle some 100 ft. in length.

Shale Storage

The shale is brought in from the quarry and dumped into a 24-in. x 36-in. single roll crusher, which reduces the material to the required size. Underneath this crusher is a 42-in. reciprocating feeder, which distributes the material on a 20-in. belt conveyor of 177 ft. 6 in. centers, on a



Dumping car



Crusher house

20 per cent incline. This conveyor is housed in wood and is supported by wooden piers. It then discharges from a 30-in. hand-propelled tripper, at the upper end of conveyor, which dumps the material into the shale storage occupying the two western bays of the storage trestle, 78 ft. in length and in line with the limestone storage. This provides for a uniform storage of shale and limestone.

Conveying to Raw Mill

Underneath the limestone and shale storage is a concrete tunnel 159 ft. long, 7 ft. 6 in. high and 8 ft. wide. (All the tunnels built by the company were of the same width and height.) This tunnel houses a 20-in. belt conveyor, 159 ft. 6 in. centers, provided with two table feeders, one for shale and one for limestone. The table feeders travel on a track beside the belt conveyor, and are driven by two 1-h.p. motors, direct connected. The top of the tunnel is provided with thirty-nine 10-in. pipes through which the material goes to the table feeders, which feed the correct percentages of shale and limestone, in this case being about 7 per cent shale, for the limestone is the waste product of the crushing plant and already contains a good percentage of clay. The belt conveyor mentioned above discharges to another belt conveyor at right angles to the first one, and is 20 in. wide and of 87-in. centers, with a rise of 20 ft., the belt being on a 20-deg. curve. This conveyor belt is entirely enclosed in concrete until it leaves the ground, where a short bridge connects the end of the tunnel with the raw material house.

These materials discharge into a 42-in. x 16-in. crushing roll, which reduces the material to 1-in. or smaller, which is suitable for compeb mill feed. The material is then reclaimed by elevator No. 1, which discharges to a 20-in. belt conveyor over the compeb mill feed tanks. This section of conveyor belt has two stationary trippers over the first two tanks, while the last tanks are filled by discharge over the belt.

The compeb mill feed tanks, of which there are three, are 15 ft. in diameter and 15 ft. high, built of steel and having a capacity of 115 tons each. The material is then fed into three wet grinding compeb mills, through an improved type shaker feed, where the water is added to the mix. The compeb mills are driven by three 500-h.p. synchronous motors, running at 180 r.p.m., direct connected to the mill through 60-in. magnetic clutches.

Magnetic Clutches

The use of synchronous motors and magnetic clutches for compeb mill drive is especially interesting. It is a well-known fact that a synchronous motor, in addition to carrying a heavy load, is an efficiency guide to the power factor

of the distribution system. By the use of magnetic clutches with this type of motor, the power factor is again raised, since the clutch has a tendency to eliminate the low starting torque of the synchronous motor. It is therefore particularly useful with motors that cannot start heavy loads. The motor is permitted to come to a normal speed before the clutch is engaged. Another thing to be taken into consideration is the safety measures which can be had with a magnetic clutch, since the magnetic clutch may be disengaged from the motor by means of a cut-off switch.

Slurry Handling

The compeb mills discharge into a trough leading to the slurry sump, where the slurry is reclaimed by elevator No. 2 and discharged into a distributing trough over eight steel slurry tanks, 22 ft. in diameter and 28 ft. 4 in. high. The slurry tanks have a central agitating device consisting of a telescopic tube and launders, thus forming a continuous agitating de-

pit 2 ft. 8 in. wide and 7 ft. deep, leading to a sump at the head of the kilns.

The slurry is elevated from this sump by elevator No. 4 and discharged into a trough over the head end or top of kiln housing. This trough is arranged with an overflow so that any excess slurry can be returned to the sump. The slurry is picked up from the trough by a ferris wheel type slurry feeder, as shown in one of the accompanying views, and discharged into a 12-in. pipe which feeds the kilns. The slurry feeder is driven by rope drive from the countershaft of kiln drive.

THE DESCRIPTION of this plant from the point where the slurry enters the kiln to the final sacking of the cement will be continued in the next issue of ROCK PRODUCTS. There will also be given a full description of the company's sub-station, which is undoubtedly the finest and most complete sub-station built at any cement plant.



Clyde Calvin, agricultural limestone sales manager, and J. A. Johnson, superintendent of quarries

vice. For further agitation, pipes are provided on the side of the tanks, and compressed air is injected into them, giving the slurry a whirling motion. The slurry tanks have a capacity of 1000 bbls. each and are set on a concrete foundation.

Through the center of the foundation upon which the slurry tanks are set is a tunnel 7 ft. wide, 7 ft. 8 in. high and 92 ft. long. This tunnel contains a 12-in. pipe and necessary valves through which the slurry is drawn out of the tanks into two concrete correction tanks, having a capacity of 1000 bbls. each. There is also an arrangement of valves, where the pipe feeding slurry to the correction tanks can be cut off and the slurry discharged direct to the sump, where it is again elevated to the slurry tanks. This facilitates further correction. While one of the correction tanks is filling, the other is being discharged through a concrete

The Why of National Trade Associations—If This Goes Through

WHAT BUSINESS MEN expect of the new administration was outlined to President-Elect Harding recently by William Butterworth of Moline, Ill., vice-president of the Chamber of Commerce of the United States. Mr. Butterworth urged that particular care be taken in the appointment of a secretary of commerce.

"In the choice of this man," he said, "business men feel that Mr. Harding has an especial opportunity to help them.

"It might well become the point of contact between the Department of State and business, in regard to matters which concern foreign trade; between the Department of Justice and business, in matters which involve trade combinations, practices, and the like; between the Department of Labor and business, in regard to relations between employers and employees.

What Secretary Could Do

"A series of great committees representing particular businesses could be organized, through which the Secretary of Commerce could keep himself in touch with them, and be assured of the most accurate possible information about conditions. Every line of business would be glad to form such a committee and to deal with such a government department with complete frankness, would be a start toward establishing that co-operation between business and the potentially helpful government agencies, that has been so useful under the British and German systems in the promotion of trade and better trade relations."—Chicago "Tribune."

Rail Rates and Transportation

Presidents and Executive Officers of Some of the Biggest Railway Systems Tell Rock Products Their Attitude on Crushed Stone, Sand, Gravel and Slag Business

ARE freight rates on sand, gravel, crushed stone and crushed slag *national* issues or matters of adjustment between *individual shippers* and their railways? Where will the agitation of the freight-rate issue at Washington and before the various state public service commissions end? Will the railways ever again encourage quarry and gravel plant operations on their lines as they did in the past? Do they want this business?

Believing that the answers to some of these questions are vital to the future of the mineral aggregate industries, Rock Products undertook to get first-hand information from the presidents of eight or ten of the largest railway systems in the country. In nearly every instance the letters were answered courteously and in some instances very fully. One very prominent railway president in Chicago was considerate enough to give the editor an hour and a half interview.

The Real Big Issue

The matter of freight rates is unquestionably the biggest issue of the industry today. There are widely divergent views as to how the readjustment of rates should be tackled. It seems to the editor the future development of the industry will be very materially affected whichever view is adopted and carried out. Rock Products has no other interest at stake than to best serve the industry. So first let us try to present the two angles of the situation as clearly as we can so that those whose pecuniary interests are at stake can draw their own conclusions.

To begin with, from the point of view of the really live-wire railway manager, transportation is a *commodity* to be bought, sold and traded in just as sand or crushed stone is traded. All the older railway rates were established on this principle, and under that system railway executives had to be keen business men, i.e., traders, just as much as in any line of business.

How the Railways Helped

Under that system, if you had a quarry or gravel pit you wanted to develop you went to your railway traffic manager, showed him the advantage of having your business and you traded your patronage for his transportation service on the very best terms you could. Traffic conditions vary so tremendously in various parts of the country, or even within the territory served by a single railroad, that the rate obtained for the same commodity elsewhere did not necessarily enter into consideration at all.

The railway man figured whether or not he could earn more money with cars which might not otherwise

be in use or whether he could use those that were working to better advantage. Every open-top car represented a certain part of the capital of the railway. It did not earn anything standing idle, but every day that it was carrying a cargo it was earning; and the average daily earning of that car must be made to equal the interest on the investment, depreciation, repairs and enough over these to pay its share of the cost of operation and the profit on the whole system.

Rates on a Business Basis

Railway traffic men say that the ton-mile earnings and the car-mile earnings are largely for statistical purposes. The thing of practical consideration is the average daily earnings of every piece of equipment that the railway owns. And if railway executives are good business men they want these daily earnings to show a maximum. Hence there may be conditions where your business is not at all attractive to them, and there may be conditions where they will be glad of it at a very nominal rate, because it fits in right with some general scheme of operation they have worked out.

That is why many old established plants have some very favorable rates which permitted them to ship over a very large territory—that is until the recent rate increases. From the point of view of efficient railway business these rates were in most cases entirely justifiable and worked to the mutual advantage of both the producer and the railway.

Under this system it was possible to develop some very large operations and to reduce costs accordingly. The railway profited directly from the traffic in the material and indirectly, in a great many cases, from the lower prices these large operations could give them on ballast.

Abuses of the System

But this system of rate-making was open to many abuses. There were possibly some cases where family or business relations were so intimate that unjustifiable rates were occasionally established. In the keenness of the roads to get business the system of secret rebates for big shippers developed, and at least one big railway man has the courage to defend this rebate system as the best from the point of view of railway business efficiency. It certainly tended to make railway traffic men more like other business men.

That is history. The chief result of the old system so far as its effect on present-day mineral aggregate traffic is concerned, was to make all recent comers into the industry pay a much higher rate for a similar service than the old-established producers. This happened

because whenever a prospective producer wanted a new rate he hunted up the lowest rates he could find anywhere for a like haul and by appeal to the Interstate Commerce Commission and the various state commissions, he battered down the railway's offered rate to the lowest possible level.

Leads to Leveling of Rates

The low rate in the first case, as already pointed out, may have been perfectly justified, while in the latter case it may have been most unfair to the railway. But the almost invariable attitude of the rate-regulating bodies was to use these low rates as precedents and to force down all other rates to the same scale. Little by little the power of the railway managers to make rates based on real business-efficiency considerations was taken away from them; and they became exceedingly chary of making any rate on crushed stone, sand, gravel or slag which could be used by some other producer on their own lines or elsewhere, to batter down rates irrespective of the merits of the particular case.

The sum total result of all these cases has been the inevitable tendency of the railways to make quotations on the commodity they had to sell—*transportation*—to newcomers in the mineral aggregate industry high enough to cover such contingencies, just as you would raise the price of your sand or stone if you knew the buyer was going to fight and haggle over it, and possibly eventually take it into the courts.

Another inevitable result is the general leveling of rates for the same length of haul or the gradual and possible unconscious adoption of the mileage or zone system of rates. Owing, however, to the fact that there are a great many old rates still in effect the situation in most cases is very complicated.

The Zone System of Rates

A great many producers are taking the stand that *all rates everywhere* on sand and gravel and crushed stone are *too high*. They want to make a national issue of freight rates on these commodities, or at least state issues. If they succeed and a readjustment of rates takes place the mileage or zone system will be the inevitable result.

The zone system is already in effect in Wisconsin. It circumscribes a market territory about each and every plant beyond which the freight rates make it impossible to ship. Except where plants are comparatively close together it gives each plant a little territory all its own. The freight rates act as wall to shut out long-distance competitors, and the prices a producer may ask within his territory are limited only by the difference in the freight rate between his plant and the job and that of his nearest competitor, or by the fear of starting new local competition.

Under the zone system every shipper knows his freight rate to any point in the state. He doesn't have to make a deal for each new point. He knows what all his competitors' rates are. Thus there are certain

obvious advantages in the straight zone system to the producer.

The disadvantages are that it makes large scale operations impossible except near large industrial centers, and even then the market is so small in compass and consequently so hazardous that it hardly justifies large plants. It works a serious injury on existing large plants by cutting down the territory they were designed to supply. It works an injury to the whole industry by encouraging a raft of small scale operations by towns, counties, contractors and municipal authorities.

The zone system of rates prevents the mineral aggregate industry from meeting this competition except by going into the business in the same way. That is the future commercial sand and gravel operator in Wisconsin, if he wants to do a large volume of business, must own and operate a dozen or a score of small plants distributed around his territory instead of a single large unit.

The ability of existing plants to produce all the material the state can possibly use may be ample, but the zone system of rates prevents any one of them from operating to a normal or possibly even to an economical capacity. In the end it is bound to give the industry a picayune character because the side-of-the-road plant with a freight-rate wall to shut off outside material can get a good share of the business anyway, and the character of the material will be poor, sacrificing all the headway that has been made in bettering the quality of the commercial article.

The Railways' Side

With the original system of rates under which the railways could use discretion both in granting new rates and in adjusting old ones the assumption was that the interests of both the railways and the shippers were the same. Both were in business to make all the money they could and the shipper could keep his territory and the railway its traffic by mutual agreement.

Practically every one of the men who dictate the policies of the railways today was brought up in this school and they frankly favor this system. Every one of them has written or told the editor that they are willing to meet any one of their mineral aggregate shippers half way on any rate adjustment that is necessary to preserve the revenue or the business of both. Naturally, since the recent increase in rates has given them the trump cards, they are keen enough business men to see that the burden of proof is with the shipper.

They don't want to be deprived of the business they need by rates that are higher than the traffic will bear. They say so in just so many words. They do not want to see all the mineral aggregate traffic, which possibly amounts to about \$200,000,000 per year, turned over to motor-truck haulage. They don't want to put the big plants—where they expect soon to buy large quantities of ballast—out of business, or on an uneconomical

basis of operation, by cutting off their normal market territory.

These railway executives do not believe the straight zone or mileage system of rates such as now exists in Wisconsin is practicable, except possibly as applied to single competitive centers, and even then it can not be rigidly applied. Leeway must be left to make exceptions. They want to deal direct with their shippers. They want to keep their shippers' markets open to them because they are out after business themselves, and they are ready and willing to make necessary adjustments to that end, and to encourage the mineral aggregate industry by every *legitimate* means, just as they used to do.

Mark the *legitimate* because they all stress this point. The mineral aggregate producers themselves have been the cause of limiting the legitimate lengths the railway men can go to help them. Under a zone system such as Wisconsin has the railway men are powerless to be

of any help. It is as much to their disadvantage to promote side-of-the-road plants as it is that of the legitimate sand and gravel industry. But the only way to help would be to reduce *all* rates, and this would not get by the Interstate Commerce Commission even if the railways were agreeable, and needless to say they are not.

The attitude of the railway executives is, so far as ROCK PRODUCTS is able to determine, that if the mineral aggregate industry makes joint cause and attempts to batter down all rates they will resist it the same as you would resist an organized attempt to reduce the price of crushed stone, sand, gravel or slag. If the shippers' fight ends in a mileage-zone system, as it must eventually do, why the shippers have made their bed and they can lie in it with all the comfort they can get.

[This discussion, with quotations from some of the letters of the railway executives, will be continued in our next.—Editor.]

Road Maintenance to Be Big Drive of Indiana Stone Men

FOLLOWING UP the points made at the recent annual meeting of the Indiana Crushed Stone Association, that road maintenance be made the big issue in this state during 1921, F. W. Connell, secretary of the Association, as chairman of the program committee of the Annual Road School, at Purdue University, January 18, 19 and 20, has given the subject of road maintenance practically the whole floor.

The subjects of the various lectures include maintenance of all types of roads, and it is confidently expected that maintenance costs of the macadam type road will be shown to compare most favorably with those of other types.

The purpose of the Road School this year is to bring about a better and more economical maintenance of the State's roads. All officials and contractors who design, construct or maintain either city streets or rural roads are invited to this conference for instruction and exchange of information and experience.

An Ohio Quarry Man on Freight Rates

AN OHIO QUARRYMAN, whose name we do not feel at liberty to disclose, has this to offer on the probable effect of the recent freight-rate advances on his commodity:

"Increased freight rates granted in September and even before, have had a very serious effect upon our business. Many contractors have gone into bankruptcy. The estimate covering much of the work they bid upon was made a long time previous to some of the recent freight rate advances. Their profits, if

any, disappeared when they had to meet increased freight rates without warning. Another thing, railroads will shortly wake up to the fact that hundreds and perhaps even thousands of local stone and gravel plants will be opened next spring. Not one penny of revenue will the railroads receive from these local operations. The present high freight rates are driving stone men, gravel men and contractors into the local quarry and gravel business. Public officials, both state and local, are squirming under these high rate levels. It is a fact that this

method, to secure additional revenue for the railroads by applying sudden and arbitrary freight advances on stone, slag, sand and gravel will, I am safe in saying, in six months, be the means of reducing their revenue from this source at least forty per cent."

A Stone Man Does His Part to Reassure the Trade

THE NEW HAVEN TRAP ROCK CO., New Haven, Conn., sent out on December 6 the following circular letter to the trade:

To avoid a CATASTROPHE you must do your part in READJUSTMENT. A great many men in your town are now idle. They will need some kind of aid; work, not charity.

Start some public work that you have held up waiting for readjustment.

This is good weather to prepare your secondary roads for winter. Shape up the surface. Harden it with an inch or two of trap rock screenings.

On most soils this will keep the surface dry and prevent heaving by frost during the winter.

We close down our plant the first of the year to be overhauled for next season. If you need trap rock before we shut down we will take care of your wants promptly.

Be sure to order before the heavy weather comes.

America never fails, when called upon, to do her duty. The sun never fails to break through the clouds. They may be war clouds, readjustment clouds, or pre-election clouds.

Remember the future of this country will be greater than the past.

W. Scott Eames, general manager of the New Haven Trap Rock Co., is a former commissioner of public works of the city of New Haven. The president, D. A. Blakeslee, and the vice-president, Clarence Blakeslee, of the company, are prominent contractors.

The Way to Get Transportation

THE sand men and stone men
Are jolly men, they say.
They work in working season
When they'd rather be at play.

They like to go a-fishing.
And they do it too, in state,
For they say there's more in fishing
Than there is in cutting bait.

They're fishing all the winter
For a chance to sell their wares.
They go fishing in the summer
As a way to drown their cares.

For when the aggregation,
And here's the thing that jars,
Have sold their stone and gravel
They never get the cars.

The coal men with priorities
Pre-empt the empty gons.
And when you ask for empties
The railroad man responds:

"There's not a car for you, kind sir,
At least not one today.
We need them all for useful things
That have the right of way."

There's coal and autos, scrap iron, too,
Is on the useful list.
For somehow when they made it up
They stone and gravel missed.

We think we've found the remedy,
Which we'll extend to you:
Just buy up all the railroads
And all the empties, too.

—E. G. Brown, Janesville Sand
& Gravel Co., Milwaukee, Wis.



Editorial Comment



ROCK PRODUCTS producers may face the new year with confidence and optimism. Whatever course the automobile and the phonograph industries may take, the building industry absolutely can not be held down very long.

This country has too much money salted down in savings banks and stocking feet not to enjoy the legitimate boom that will come when this money is put into real estate and permanent improvements in buildings and public works.

Foundry sand and flux stone producers will not be big sufferers because it is only a question of months before the railways become big buyers of rails, rolling stock, bridges and equipment that will keep the steel mills and foundries working to capacity.

Producers of phosphate rock and agricultural limestone fear a temporary tightening of the farmers' purse strings because of the present low prices of farm products, but the farmers made a dollar or two during the war as well some other people, and they are wise enough to put some of their savings into increasing the fertility of the soil just as soon as they get over their present grouch.

The optimists, and there are many of us, only fear that the boom will develop so rapidly, the industry will not be able to take full advantage of it.

And after all 1920 was not such a rotten year. The cement, lime and gypsum industries got out about 75 per cent of their capacity. Nearly every one did a lot more business, notwithstanding handicaps, than they did in 1919. The chief disappointment of the crushed-stone, sand and gravel industries was that after about doubling the capacity of their plants they were unable to operate more than half the time.

A prosperous and glad new year to you all!

The optimistic prediction in the last issue that Congress would yield to the tremendous pressure from all sides and make hasty amendment of the **Esch-Cummins** Esch-Cummins railway law merely showed our ignorance of Washington methods. Instead it looks very much as if this Congress will not have much to do with it. The situation is complicated because the particular features which are obnoxious to the construction industries are not the only features of the law that have been attacked.

The labor unions, the railways and various other interests have much fault to find with certain other provisions and it is likely the whole law is due for a general overhauling, which may take as long as it did to germinate this remarkable piece of legislation.

However divided the crushed-stone, sand, gravel and crushed-slag producers may be on the subject of an amalgamation of these industries, they certainly are all one on the repeal of certain sections of the Esch-Cummins railway law. Since the National Association of Sand and Gravel Producers happens to be Johnny-on-the-Spot, with a Washington office, a very able manager and an expert traffic lawyer to work for it, it should have the *unanimous* support, not only of the mineral aggregate industry but of all the other construction material interests, the general contractors and the highway officials as well.

Mr. Sutton, manager of the Association, has already taken up the subject of revising the Esch-Cummins law with the Senate Committee on Reconstruction and Production, and the chairman of that committee, Senator Calder, invited Mr. Sutton to draft the proposed changes. This Mr. Sutton has already done, and you can depend upon it he will stay with his work until Congress acts.

The manager of the National Association of Sand and Gravel Producers should therefore have your earnest support, whatever kind of mineral aggregate you produce and whatever your opinions may be as to permanently affiliating with the Association. You can help financially and you can help by building fires under the seats of your congressmen and senators. At least, do one or the other.

As an addendum to the foregoing it might be said that through the kind co-operation of one prominent producer in each state, and on the suggestion of General Manager Sutton, **Educating Congressmen** marked copies of the December 18 issue of **ROCK PRODUCTS**, containing Mr. Nattkemper's article on the Esch-Cummins law, have been sent to over half of our Congressmen and Senators, reinforced, in each case, with personal letters from the producers.

Altogether, with Mr. Nattkemper's article and the reports of the meetings in the various states, this should furnish argument enough to build quite a case, and every producer is urged to take advantage of the situation to push the issue while it is hot. There is no logical reason why amendment of these particular sections should wait on any general revision of the law and those writing their Congressmen are urged to stress this point and to emphasize the urgency of early action to stabilize prices and conditions in the construction industry.

There is every reason in the world why your road official and contractor friends should help you out.

Review of Rock Products Prices During the Year 1920

Higher Average Prices Than 1919, but Great Variations Show Actual Prices Are Fixed Entirely by Local Factors

A STUDY OF THE PRICES of various rock products should be both interesting and of real value to producers in making them better acquainted with their material in its commercial phases.

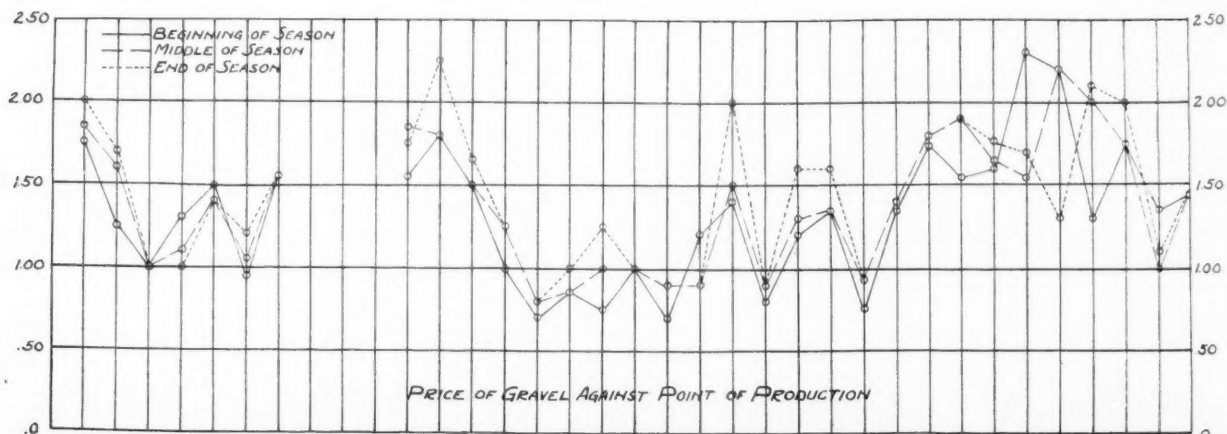
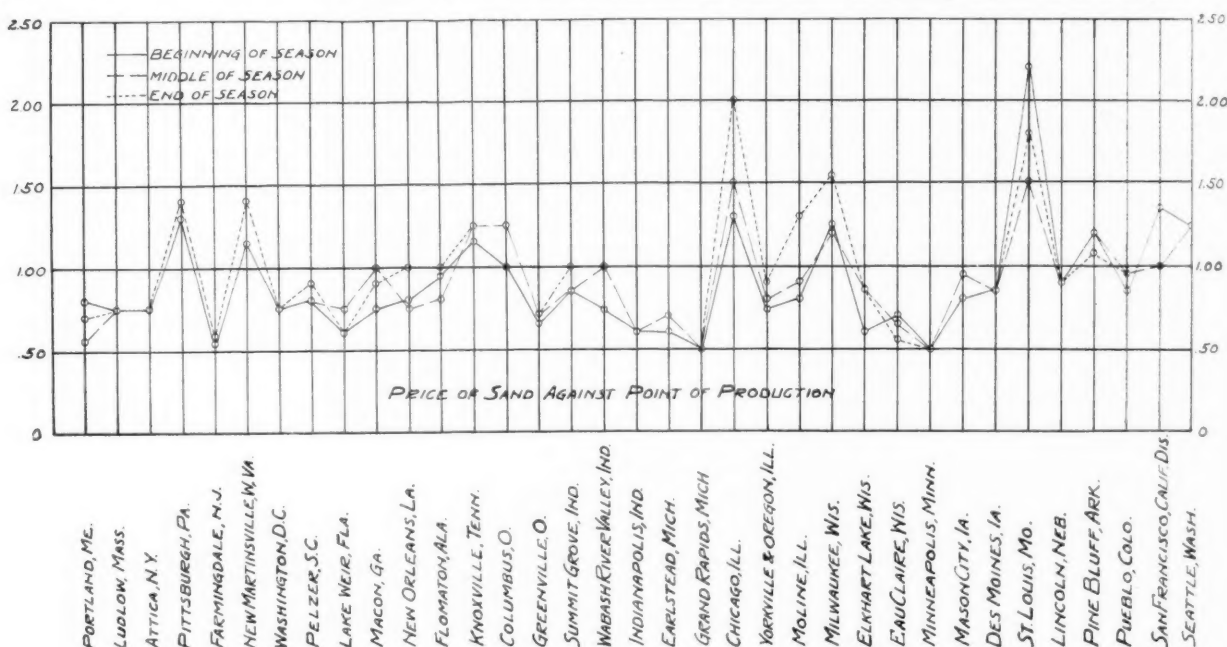
Owing to the generous co-operation of many producers throughout the country Rock Products was able in 1920 to collect and quote prices at a great many more producing points than are shown in the

accompanying graphs. Only typical ones, designed to show the price range in the industry from coast to coast and at a few points in Canada have been selected.

The prices plotted against a certain producing point do not necessarily mean that all the quotations came from a single producer, as in many cases they are average prices of several producers.

As in our price review of last year, the

most striking feature of all the graphs is the great variation in price for the same commodity in different localities. This is, of course, the result of both operating conditions and of local business conditions, and in the case of silica, foundry sands, limestone and agricultural lime also probably depends in some measure on the quality or purity of the material.



Price range of sand and gravel at various shipping points in 1920

Sand and Gravel

The average price of washed and screened sand in 1920 was about 90 cents per ton f.o.b. plant. This is 15 cents, or 20 per cent, higher than the average price of the same commodity in 1919. This is, of course, accounted for by increased labor costs and the transportation difficulties. The average price of washed and screened gravel in 1920 was about \$1.30 as against \$1.15 in 1919. The percentage of increase was therefore a trifle less for gravel than for sand. This is probably accounted for by the fact that the demand for sand for general building work was

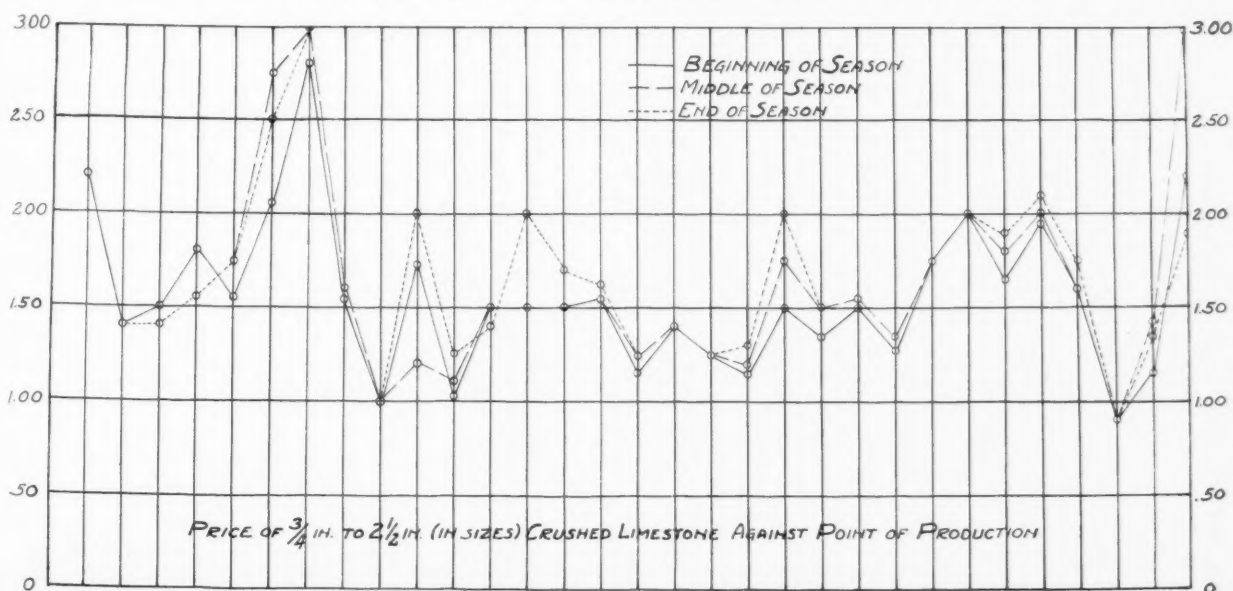
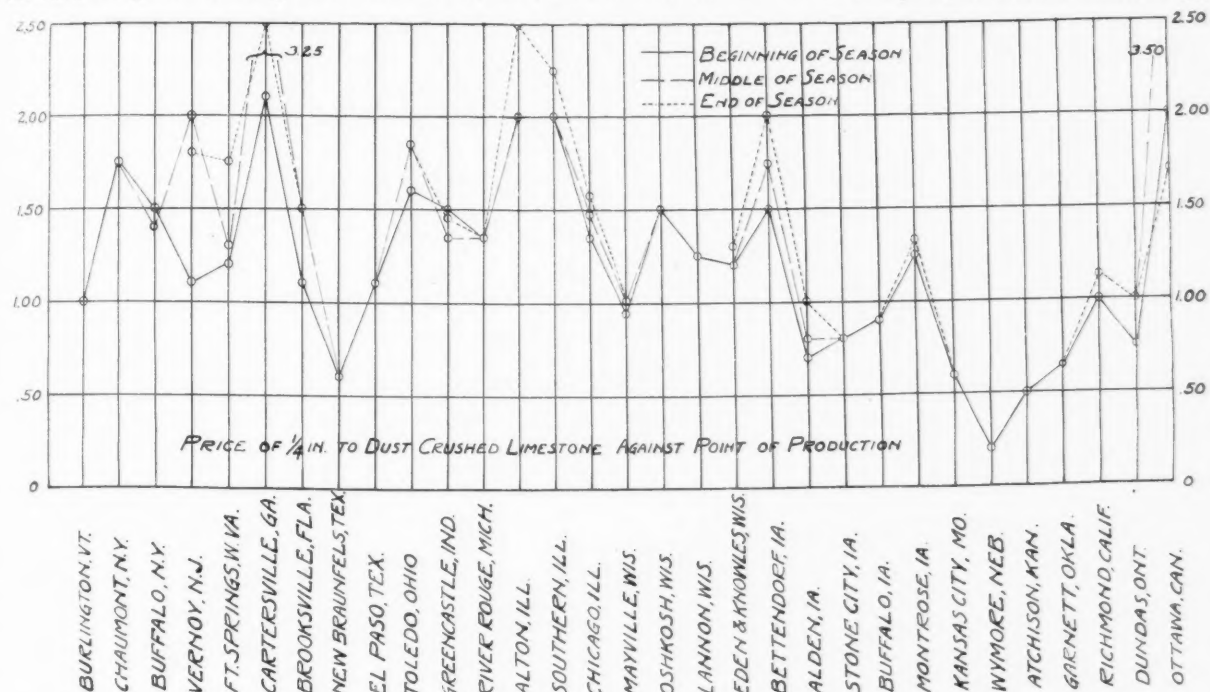
somewhat in excess of the demand for gravel for road work, which was the kind of construction worst hit by the transportation tie-up.

The highest points in the plot showing prices at different producing points are generally accounted for by the fact that there are large industrial centers and the prices noted include some freight, or charge for bringing the material to wharves by barge. The principal feature of these curves is that prices throughout the Central West are lower than the extremes, East, South and West.

Crushed Limestone

The average price of limestone screenings in 1920 was about \$1.20 and of crushed limestone in commercial sizes about \$1.60, making the average price of all crushed limestone about \$1.40 per ton, f.o.b. producing plant, against about \$1.25 per ton for 1919. The average price, therefore, increased slightly more than 10 per cent in spite of all the difficulties of operation. The greatest increase in value was in the screenings and is accounted for by the steady increase in the use of these for agricultural limestone.

The prices of crushed limestone were



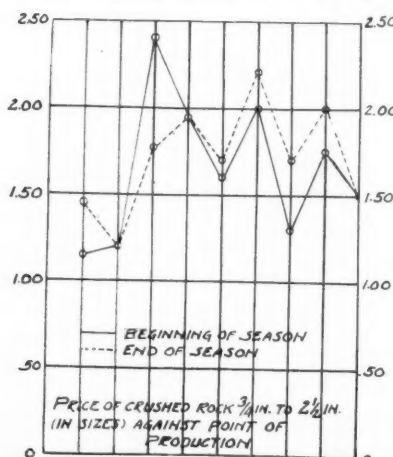
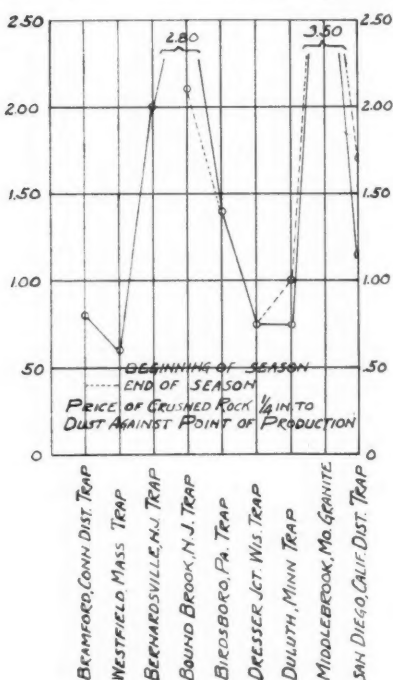
Price range of crushed limestone at various shipping points in 1920

fairly uniform except for the peak in the South, and this is accounted for by the fact that principal product here went into agricultural limestone or for some other special purpose, the amount of commercial crushed stone was relatively small.

Crushed Trap Rock

The price range of trap rock screenings shows tremendous variations. Apparently the price of these is affected very much by the type of road commonest in the vicinity of the plants. These screenings are very much in demand for top dressing bituminous macadam roads and wherever this type of road is common, as in New Jersey, Pennsylvania and Maryland, a good price can be had for the product.

The average price of commercial sizes of trap rock was about \$1.65 per ton



Price range of crushed trap rock at different producing points

f.o.b. plant. Including screenings, the average price would be about \$1.40, or the same as the average limestone price.

Agricultural Lime

The analyses and quality of agricultural lime varies so much that price comparisons mean very little. Some lime manufacturers sell run-of-the-kiln lime, others sell their best grades for this purpose. The price is also very materially affected by the relative amounts of agricultural lime and other business done. For example, where there is a big demand for chemical purposes or construction work and agricultural lime is only a sideline, the price of the latter is chiefly fixed by the price that could be obtained for the same product for the other purposes. The average price for the year was well above \$8 per ton, f.o.b. plant.

Crushed Slag

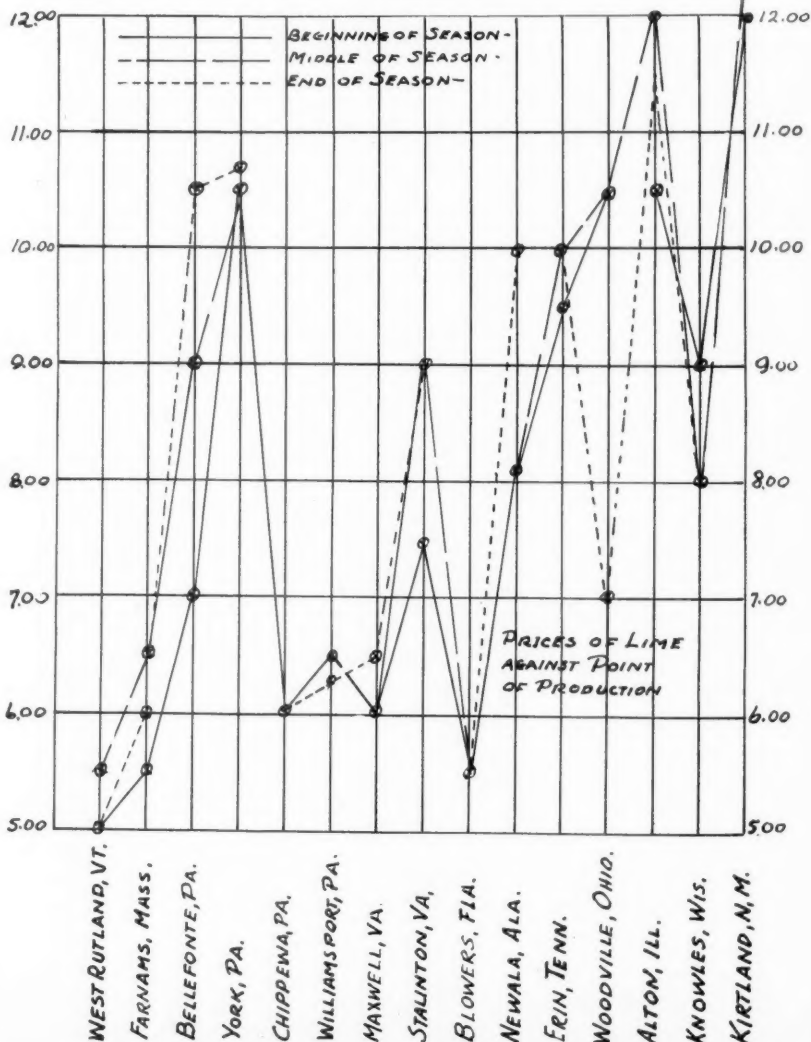
Slag prices were quite uniform except

in one or two instances, probably accounted for by scarcity of competitive materials and exceptional building activity. Roofing slag, the best priced product made, ranged about \$2.25 per ton, while the commercial sizes of slag averaged about \$1.25, or practically the same as its competitor, gravel.

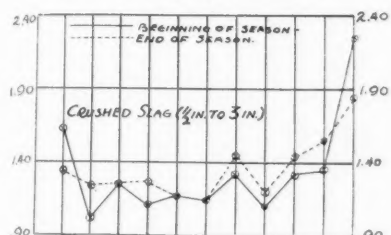
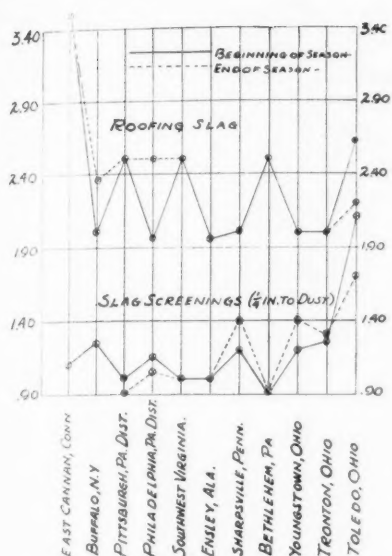
Silica Sand

Glass sand was fairly uniform in price at about \$2.75 per ton f.o.b. plant, but showed a marked increase as the season advanced, owing to the acute shortage in the box cars. The cement industry was so short on box cars that it had to use many open-top cars, and the glass-sand industry had mighty few leavings.

Foundry sands averaged about \$2 per ton. The price did not have a great range except in one or two instances. The extremely low point in Michigan is accounted for by the fact that this particular material requires no mechanical



Price range of agricultural lime at typical shipping points during 1920



Price range of slag during 1920

preparation whatever; it is simply shoveled up off the beach.

Agricultural Limestone

As was to be expected, agricultural limestone shows a tremendous range of prices from one end of the country to the other. This is accounted for largely by the newness of the industry in many sections and by the great variety of materials sold under this name—that is, the variety of sizes—some being very fine and some only crushing plant screenings.

The average price of agricultural limestone in 1920 was about \$2.50 per ton, or 50 cents, higher than the 1919 price. A part of this increase is undoubtedly accounted for by a more careful preparation of the material and the increasing appreciation of the material by the agricultural industry.

Seasonal Changes

Nearly all the rock products under consideration showed a material advance in price as the season developed, owing to slowing up of production because of the car situation.

The graph for agricultural lime is interesting and looks as if the material had difficulty finding its level.

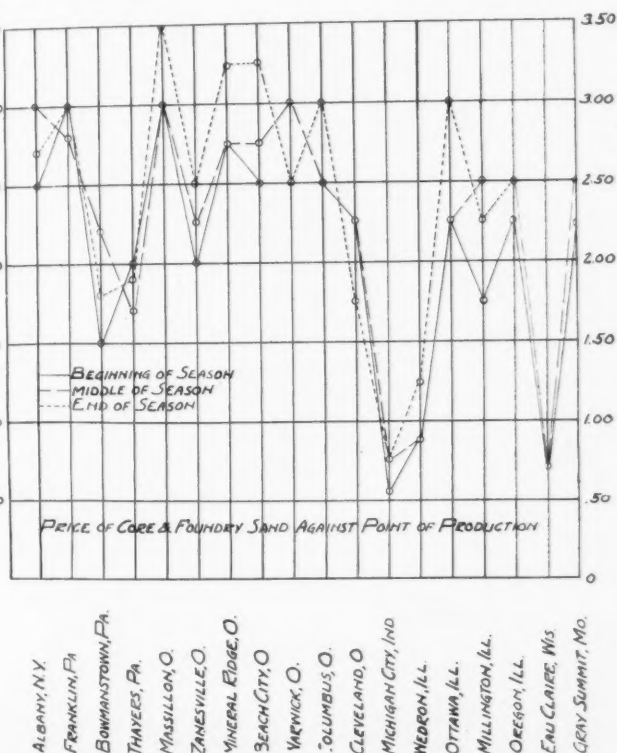
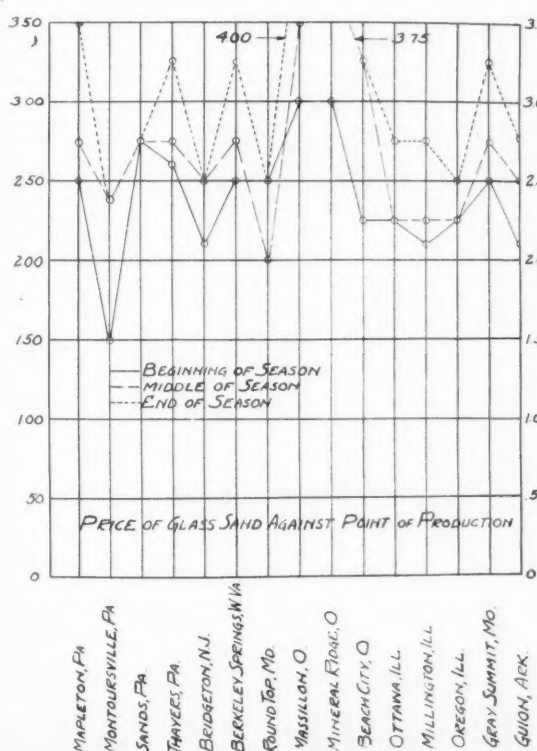
Trap rock evidently went up in price early in the season because of the tremendous demand for highway construction purposes, but dropped back when the

railways tied up all this work by the coal priorities.

Use for Blast-Furnace Slag; Slag-Lime Brick

THE GERMANS during the war, when materials were scarce, gave a great deal of attention to the utilization of blast-furnace slags. "Nature" states that a new use for slag is foreshadowed in Germany, that is, for the manufacture of light bricks for building purposes. By passing molten slag horizontally through water, the steam generated blows out or extrudes the slag-jet, and forms what the Germans term "spume" slag or artificial pumice-stone. This material has been patented under the name of "thermosite," owing to its excellent heat-insulating properties.

The patentee has also invented a press for pressing bricks formed of small pieces of this artificial pumice and a mixture of slag, sand, and slaked lime which is used as a binder. The bricks thus formed are strong and light, and resemble in their properties the tuff obtained in the neighborhood of Andernach. As in addition they can be pressed to large dimensions, less mortar will be required in building operations. The German authorities have approved of the new type of brick for house-building—"Mining and Scientific Press."



Price range of various kinds of silica sand during the year of 1920

Monmouth Stone Co. Begins Operations with Big Blast

THE MONMOUTH STONE CO., Monmouth, Ill., whose new crushing plant was but recently completed, began operations on Dec. 15, 1920, with a blast that loosened 85,000 tons of stone, requiring the use of 12,400 lbs. of dynamite at an approximate cost of \$8,000.

People from all around the county neighborhood turned out to witness the blast, at the invitation of stockholders and friends of the new company. It was really a local celebration.

Preparation for the blast that made available the stone for the crusher has been going on for a number of weeks past. Dozens of holes have been drilled into the solid rock about 12 ft. apart. Into these holes 12,400 lbs. of dynamite was dropped. The shot was set off by means of electric blasting caps as detonators.

The Monmouth Stone Co., which was incorporated in June, 1919, by J. H. Jayne, J. W. Houston, A. V. Peterson, E. E. Wood, E. A. VanTuyne and R. L. Everett owns the quarry formerly operated by the Wahlbaum Quarry which ceased operations about 33 or 34 years ago. Since then the quarry has been idle.

E. L. Shaw & Co., Chicago, Ill., designed the crushing plant and the crushing and other machinery for handling the stone was furnished by Allis Chalmers Co., Milwaukee, Wis.

The power for the plant is obtained from the Keokuk, Ia., dam over a power line constructed of three lines of No. 4 copper wire, with transformers, switches and all necessary wiring for the building of the line and bringing it to the plant. It comes into the transformers at 33,000 volts and approximately 1,000 H. P. is used for both lighting and power purposes. The building of this power line cost \$33,000.

The capacity of the new plant will be 4,000 tons of crushed stone and 600 tons of agricultural limestone per 24 hours. The stone will be crushed in 8 different sizes, from $\frac{1}{4}$ to $2\frac{1}{2}$ -in. Steel bins having a total capacity of 1,300 tons have been provided for storage.

The operating part of the plant is some different than the ordinary stone crushing plants, in that the main crushing machine is placed down in the ground instead of being elevated in the air, which would make it necessary to carry the stone from the cars, up to it. This excavation, made necessary for the largest crusher, is 32 ft. deep and was blasted out of solid stone, then thoroughly concreted. The crusher is so arranged, that a train of cars are passed by the mouth

of the crusher and each car automatically dumps its contents into the opening. The four smaller crushers are placed on a large concrete foundation, 20 ft. high.

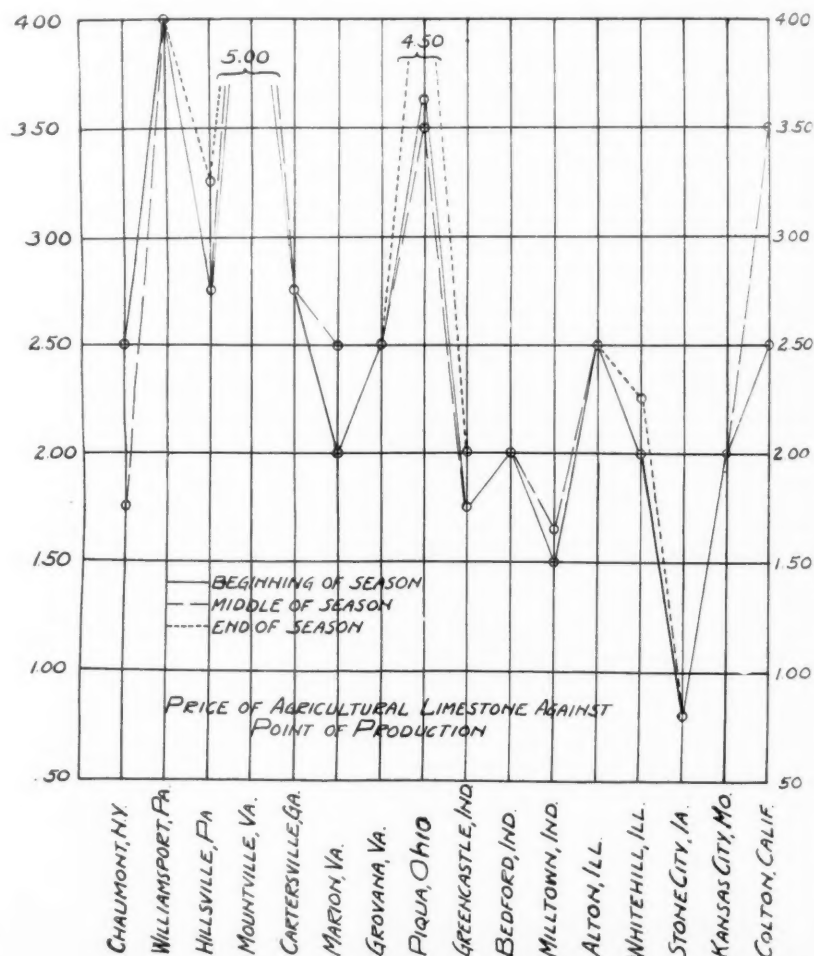
The company invested over \$40,000 in railroad tracks and switches, having two sidings on the Chicago, Burlington & Quincy R. R., which will accommodate 8 empty cars. The company's own 60 ton switch engine will do the switching of cars, both on the siding and at the works, the quarry being located some 1,700 ft. from the main line of the C., B. & Q. R. R.

Lime and Cement Industry of Finland

THERE ARE TWO PORTLAND CEMENT FACTORIES in Finland. One of them, the Pargas, Kalkbergs Aktie-Bolag, located at Pargas, has a joint-stock capital which was increased in 1919 from 10,000,000 marks to 15,000,000 marks and has a production capacity of 450,000 barrels a year, with machinery capable of increasing this to 900,000 barrels a year.

The other factory is the Lojo Kalkverks Aktie-Bolag located at Lojo. It has a joint-stock capital of 3,800,000 marks and a production capacity of 225,000 barrels per annum, which will soon be doubled. Besides making cement, both of these companies carry on the breaking of limestone and the manufacturing of lime, most of which has been used by the cellulose factories, the sales for agricultural use having been insignificant.

During the year 1919 the cement factories in Finland worked only for home consumption and the sales were small because of the limited building activity. No cement or lime was exported, as such export was prohibited, but some cement was imported from Esthonia. It is thought that the sale will be greater in 1920 and that the domestic factories will be able to supply the wants of the country, although there will be little excess for export from Finland. The existing stocks of cement and lime are intended exclusively for the Finnish market, and neither of these commodities can be exported or imported at present without a special permit.—U. S. Consular Reports.



Price range of agricultural limestone during 1920

South African Lime Industry Booming

THE Umzimkulu Lime and Cement Co. Port Shepstone, Natal, South Africa has what is probably the largest deposit of limestone in South Africa, which occurs in two distinct forms, one crystalline (commonly known as marble), and the other tuffaceous. Of both forms there are inexhaustible and easily accessible quantities. The "marble" yields a "lean" lime of somewhat hydraulic character, pure white, and admirably adapted for fine mortar and plastering work. The late Natal Government, after protracted tests and lengthy experiments of

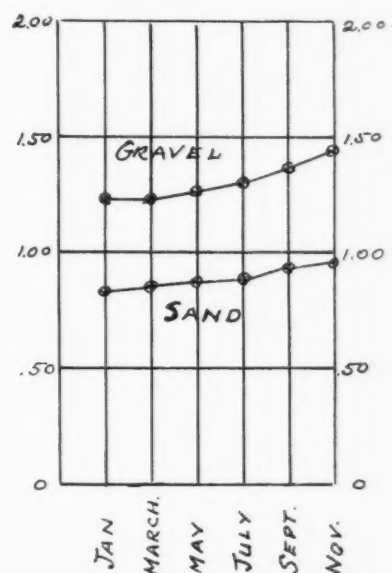
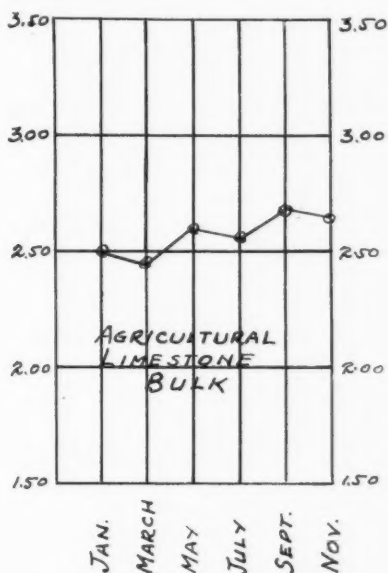
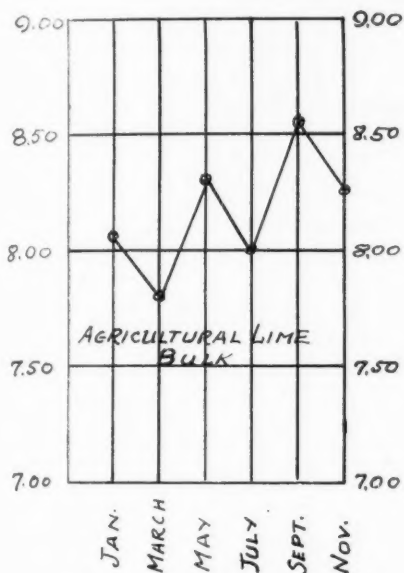
the lime, was completely satisfied with it for all building purposes, and it has been specified for mortar and plaster in large public buildings. It has been used for plastering purposes in such buildings as the Pietermaritzburg (Natal) and Durban (Natal) Town Halls, the General Post Office, and the Natal Colonial Buildings, and for mortar and plastering in school buildings. A demand for the lime has arisen in other parts of South Africa.

Research Work on Potash

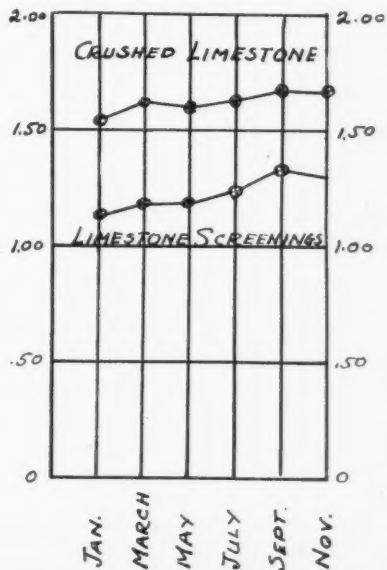
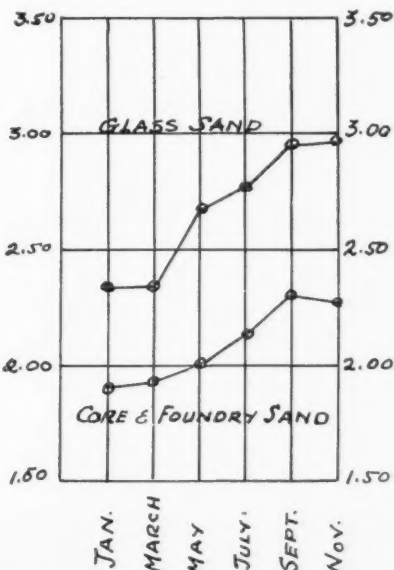
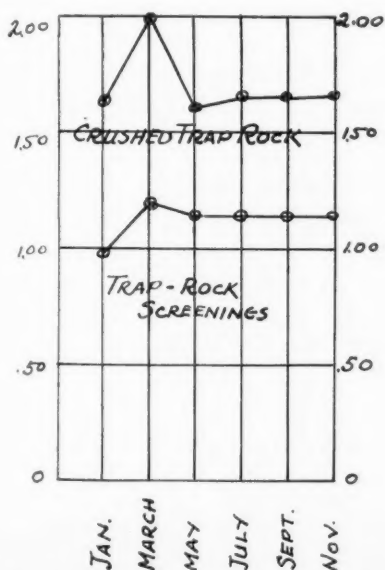
THE WORK of analyzing the raw materials and slags from the blast-furnace industry to determine if possible the

amount of potash now lost in that industry which might be collected for fertilizer has been carried on by the United States Bureau of Soils during the last year and is expected to be completed during the current fiscal year. It is evident from the work so far done that a very large amount of potash can be made available from this source if suitable collecting apparatus is installed. The bureau is also conducting research work in the commercial collection of potash from cement kilns.

It is believed that while interest in potash recovery at cement plants has temporarily waned, that it will revive as soon as conditions become stabilized.



Average prices at various seasons of the year for agricultural lime (bulk), agricultural limestone, and sand and gravel



Average prices at various seasons of the year for trap rock screenings, glass sand, core and foundry sand and crushed limestone



Accident Prevention



Sparks From Steam Shovels and Locomotives as Causes of Premature Explosions

By SPENCER P. HOWELL (Explosives Engineer, Bureau of Mines), and J. E. CRAWSHAW (Explosives Testing Engineer, Bureau of Mines)

A RECENT PREMATURE EXPLOSION in a quarry that resulted in the death of nine men and the injury of several others, was directly traceable to a spark from a steam shovel working under the face directly in front of the hole being loaded. This accident and similar accidents on record in the Bureau of Mines indicates the necessity for pointing out the dangers in quarries of explosives being ignited by sparks emitted from steam shovels and locomotives, and making recommendations for greater safety.

Many premature explosions of which the following are examples, have resulted from sparks, both from steam shovels and passing locomotives.

(A) The premature explosion occurred during August, 1920, at a limestone quarry, in a 100-foot drill hole, loaded with 1000 pounds of high grade nitroglycerin and gelatin dynamites. This hole had been loaded with 500 pounds of 75 per cent strength gelatin dynamite, 300 pounds of 60 per cent straight nitroglycerin dynamite, and 200 pounds of 50 per cent straight nitroglycerin dynamite; but no stemming had been placed in the hole. The powderman loading the hole saw the spark enter the hole and was able to run a short distance before the explosion took place, thus escaping serious injury. The explosion of this first hole was transmitted to a nearby hole similarly charged. The fall of rock from these two holes buried the steam shovel and some of the gang of men working around it.

(B) In September, 1909, in the Canal Zone, a steam shovel uncovered a misfired charge of dynamite. While the dynamite was being picked up the steam shovel continued working nearby. A spark from the shovel set fire to some loose dynamite spilled on the ground from the broken cartridges. This fire was transmitted to a hole which was being loaded close by and caused a premature explosion. One man was injured.

(C) In September, 1912, in the Canal Zone, a spark from a passing locomotive set fire to a piece of paper near dynamite that was being loaded into a hole. The paper set fire to the loose dynamite cartridges, which in turn caused the detonation, without prior burning, of unopened boxes of explosives nearby. None were injured.

(D) In August, 1907, in the Canal Zone, a hot cinder from a passing locomotive fell

into a lot of prepared primers, setting fire to the dynamite; an explosion immediately followed. None were injured.

(E) In September, 1912, in the Canal Zone, a spark from a passing locomotive set fire to the explosive in a drill hole, causing a premature explosion, injuring several men.

(F) In January, 1907, in the Canal Zone, a spark from a passing locomotive fell into an open black powder can, igniting the powder. The other cans nearby were in turn ignited, injuring several men.

From the above mentioned accidents, certain very important recommendations for safety can be made, and these should be carefully observed.

(1) The general principle should always be followed that workmen should never be allowed at the base of a quarry face within the zone of possible danger from falling rock after the work of loading the hole has begun, and the presence of workmen in the area between the line of holes and the face should be avoided.

(2) Before loading is begun, the steam shovel and locomotives should be withdrawn from the face of the quarry to such a distance that under no circumstance could sparks from them be carried to the explosive in the holes or on the ground above or around it, or if such equipment is not removed it should not be operated.

(3) If there is any unavoidable danger from sparks or cinders a canopy should be provided which will protect the explosive from flying sparks. A covered hopper may be used for black blasting powder.

(4) Where an unexploded charge is uncovered by the steam shovel operations should cease until all of the explosive has been recovered and removed to a safe distance.

(5) Every piece of paper or other inflammable material should be removed from the vicinity where explosives are placed during loading operations.

(6) Primers should be kept in a portable metal box with a hinged cover and should not be stored close to the explosive, especially while the holes are being loaded.

(7) Unopened boxes of explosive should not be stored close to the hole being loaded, but should be opened at a distance from it and brought up as needed.—U. S. Bureau of Mines, Reports of Investigations.

Accident Prevention in Haulage

By L. J. Boucher, Superintendent, Atlas Portland Cement Co., Hannibal, Mo.

ACCORDING TO the information collected by the Bureau of Mines, over 12% of the total number of injuries in the United States quarries came under

haulage class. Whether this includes maintenance of haulageways, I am not informed. However, it shows that one of the greatest hazards in quarrying is haulage. At the Hannibal quarry, about 18% of the injuries during 1918 and 1919 were due to haulage. By haulage we include the hazards of switching and those of track maintenance. The accidents due to maintenance were not serious, practically all of them being mashed fingers or toes, resulting from the careless handling of tools and track material. These hazards can only be reduced by teaching safety.

To eliminate the hazards of switching or removal of the raw material from the quarry, there are several precautionary measures that are necessary to follow up closely. The switchmen must be made to be careful when handling cars, especially when coupling or running ahead to throw a switch. Employees must not be allowed to ride on locomotives or cars and they must be educated to keep their eyes and ears open when it is necessary for them to walk on the tracks. The ground about all switch stands should be level, and clear of rocks and other objects over which a switchman might stumble. Good clearance must be given between the cars and rock or other material along the sides of the track. The switchmen in our quarries are encouraged to report any condition which may appear to be dangerous and we endeavor to promptly correct it.

The cars are inspected daily and tagged if they are found to be in bad condition, and the tagged cars are promptly set out on a repair track by the switchmen. Every effort is made to keep all steps, hand holds and coupling pin lifters, etc., in first-class condition. Hand holds have been installed on the cars at the most convenient places, these places having been determined by the switchmen themselves. When loading cars the shovel runners must see that they do not leave rock projecting over the sides and ends. While they are required to load the cars to capacity, yet they must load them safely. By following these rules the hazards and the number of injuries in the Hannibal quarries have been materially reduced.

A great many quarries have incline haulageways to the crusher or bins. While we have none in the Hannibal quarries, we have an incline shaft at our shale mine. Two and one-half ton capacity end dump cars are hoisted some 200 feet to a tipple where the shale is dumped into standard steel railway cars for transfer to the mills.

New Machinery and Equipment

New Cement Clinker Storage Crane

By A. R. Ulbrich, Sales Manager, Terry Manufacturing Co., New York City

"ONE OF THE MOST IMPORTANT considerations in connection with the manufacture of portland cement is maximum clinker production." This recent statement by the chemist of a prominent cement company would indicate the necessity of providing for proper storage and employing the most efficient equipment for handling the clinker in and out of storage with maximum output and minimum shut-downs for repairs.

The Terry "Trojan" full-circle crane, illustrated in the article on the new Bessemer cement plant elsewhere in this issue, has been designed and built primarily to meet all of the exacting requirements of cement clinker storage handling and to overcome the objections to the usual types of cranes now in use in some plants doing similar work.

Mounted on a concrete foundation about 25 ft. high, located in the center of a circular 150,000 bbls. storage pile, the crane functions as follows when going through the cycle of operation in storing and reclaiming the clinker.

Starting at the green or fresh clinker pit, the grab bucket picks up its full load of green clinker and is sent on its way to storage pile where the clinker is deposited, the bucket is then loaded with seasoned clinker for the return trip, depositing the seasoned clinker in the receiving pit. Here the clinker is sent on its way to the grinders. Both storing and reclaiming operations are performed in one cycle, handling 8 tons or about 40 barrels of clinker in and out of storage in approximately two minutes.

In the design and manufacture of this "Trojan" crane every phase of the cement clinker storage problem was given thorough consideration. It is economical in both initial and operating costs and built to stand up under most severe duty, giving a minimum of shut-downs for repairs.

The operator is placed in the right-hand forward side of the cab and has an unobstructed view of his work at all times. Proper light and ventilation are also provided for the convenience of the operator. All functions of the crane are governed by two-motor control with levers banked in quadrant, properly placed so that the operator has complete control at all times.

The highest degree of standardization has been employed in the building of this crane. All parts are standard, so that they can easily be replaced if and when

required. All bearings have been made dust-proof to prevent damage from clinker dust. Large bronze bushed sheaves with proper facilities for lubrication are used throughout for high-speed bucket duty. The most modern type equalizer trucks are used for operation on the roller turntable. Steel gears are of course used throughout. The entire crane is constructed of structural steel with necessary steel castings. All parts are accessible to easy inspection.

Users of this crane refer to it as the best type of crane equipment they have ever employed for similar work. It has been evolved by a company having 20 years of varied experience in building derricks and cranes of various types to solve material-handling problems for many lines of industry.

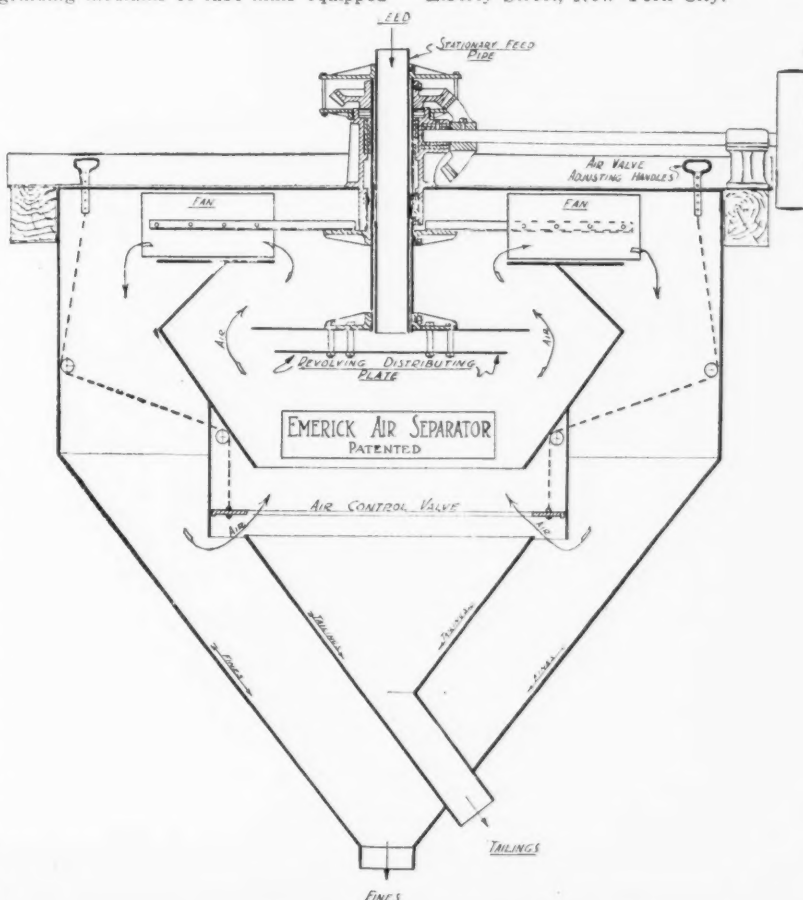
Emerick Type Air Separator

AN IMPROVED TYPE air separator designed to overcome the cushioning effect of already fine material on the grinding mediums of tube mills equipped

with internal screens has been perfected by the Emerick Mill Co. The objection is overcome by the Emerick air separator by removing the fine material as it is produced by the grinder and allowing the oversize to be returned, thus increasing the efficiency by causing the mill to work on fresh material, unhampered by that already ground, thereby greatly increasing the output.

The machine is very simple, consisting of an outer casing, an inner separating chamber, a hollow shaft to which is attached a fan and carrying a distributing plate at its lower end, a stationary feed pipe extending down inside the hollow shaft, a damper to regulate the amount of air circulating through the inner chamber, together with a pair of gears, shaft, pulley and bearings. Two openings in the bottom provide for the discharge of the fine material and tailings. Manholes are provided in the cover.

The sales representative for the Emerick Mill Co. is Rupert M. Gray Co., 114 Liberty Street, New York City.



Sectional view showing diagram of air current

The Rock Products Market

Wholesale Prices of Crushed Stone

Prices given are per ton, F. O. B., at producing plant or nearest shipping point

Crushed Limestone

City or shipping point	Screenings, ¾ inch down	¾ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
EASTERN:						
Buffalo, N. Y.	1.00	2.50	2.00	2.00	2.00	2.00
Burlington, Vt.	1.80	2.25	2.00	1.80	1.80	1.80
Califon, N. J.	1.50	1.50	1.50	1.50	1.50	1.50
Chaumont, N. Y.	1.80	1.80	1.80	1.65	1.65	2.00@2.25
Coldwater, N. Y.	1.45	2.50	2.40	2.00	1.60	1.45
Grove, Md.	1.70	1.25	1.25	1.25	1.25	1.25
North Leroy and Akron, N. Y.	1.35	1.85	1.85	1.85	1.85	1.85
Redington, Pa. (dolomite)	1.00	2.25	2.00	1.80	1.60	1.60
Utica, N. Y.	2.00	2.25	2.00	1.80	1.60	1.60
Vernoy, N. J.	1.00	2.50	2.00	1.45	1.45	1.45
CENTRAL:						
Alden, Ia.	1.00	1.50	1.45	1.45	1.45	1.45
Alton, Ill.	2.50	2.00	2.00	2.00	2.00	2.00
Bettendorf, Ia.	1.58	1.90	1.70	1.58	1.58	1.58
Buffalo, Ia.	1.58	1.90	1.70	1.58	1.58	1.58
Chicago, Ill.	1.58	1.90	1.70	1.58	1.58	1.58
Cincinnati, Ohio	1.58	1.90	1.70	1.58	1.58	1.58
Cleveland, Ohio	1.58	1.90	1.70	1.58	1.58	1.58
Columbia, Ill.	1.58	1.90	1.70	1.58	1.58	1.58
Coralville, Ia.	1.58	1.90	1.70	1.58	1.58	1.58
Davenport, Ia.	1.58	1.90	1.70	1.58	1.58	1.58
Dundas, Ont.	1.00	1.50	1.50	1.35	1.25	1.20
Eden and Knowles, Wis.	1.30	1.30	1.30	1.30	1.30	1.30
Ft. Wayne, Ind.	1.60	1.90	1.90	1.80	1.60	1.60
Greencastle, Ind.	1.25@1.50	1.50	1.25	1.25	1.25	1.25
Illinois, Southern	2.25	1.75	1.75	1.75	1.50	1.50
Kansas City, Mo.	1.10	1.10	1.25	1.20	1.10	1.10
Kokomo, Ind.	1.80	1.30	1.50	1.40	1.30	1.30
Krause or Columbia, Ill.	1.25	1.25	1.25	1.25	1.25	1.25
Lannon, Wis.	1.80	1.60	1.50	1.50	1.50	1.50
Lima, Ohio	1.00	1.45	1.25	1.25	1.25	1.25
Linwood, Ia.	1.70	2.20	2.00	1.90	1.70	1.70
Mansfield, Ohio	1.70	2.20	2.00	1.90	1.70	1.70
Mayville, Wis.	95@1.00	1.20	1.20	1.20	1.20	1.20
Montrose, Ia.	1.35@1.50	1.75@1.85	1.75@1.85	1.70@1.80	1.65@1.75	1.65@1.75
Oshkosh, Wis.	2.00	2.25	2.25	1.75	1.75	1.75
Ottawa or Hall, Can.	1.25	1.50	1.50	1.50	1.25	1.25
River Rouge, Mich.	1.25	1.50	1.50	1.50	1.25	1.25
St. Louis, Mo.	1.30	1.30	1.30	1.30	1.30	1.30
Sheboygan, Wis.	1.80	1.65	1.65	1.65	1.65	1.65
Stolle, Ill. (I. C. R. R.)	1.80	2.10	2.10	2.10	1.85	1.85
Stone City, Ia.	1.75	2.40	2.40	2.40	2.15	2.15
Toledo, Ohio, f. o. b. cars.	1.75	2.40	2.40	2.40	2.15	2.15
Toronto, Canada	2.90*	3.25*	3.25*	2.90*	2.90*	2.90*
Winnipeg, Can.	2.90*	3.25*	3.25*	2.90*	2.90*	2.90*
SOUTHERN:						
Cartersville, Ga.	2.50	2.50	2.50	2.50	2.50	2.50
Chickamauga, Tenn.	1.50	1.75	1.75	1.75	1.75	1.75
Columbia, S. C.	1.00@1.25	3.50	3.50	3.50	3.50	3.50
El Paso, Tex.	1.00	1.00	1.00	1.00	1.00	1.00
Fort Springs, W. Va.	1.85	2.00	2.00	1.70	1.60	1.60
Garnett, Okla.	.65	1.75	1.75	1.75	1.60	1.60
Mascot, Tenn.	.60	1.50	2.00	1.50@2.00	1.50	1.50
New Braunfels, Tex.	.60	1.75	1.75	1.50	1.50	1.50
WESTERN:						
Atchison, Kans.	.50	2.10	2.10	2.10	2.10	2.10
Blue Springs and Wymore, Neb.	.20	1.95	1.95	1.85@1.90	1.75@1.80	1.70
Kansas City, Mo.	.60	2.00	2.00	1.50	1.50	1.50
Duluth, Minn.	1.00	2.25	2.00	1.50	1.50	1.50

Crushed Trap Rock

City or shipping point	Screenings, ¾ inch down	¾ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
Bernardsville, N. J.	2.00	2.20	2.00	1.80	1.50	1.50
Brarford, Conn.	.80	1.75	1.65	1.45	1.25	1.25
Birdsboro, Pa.	1.40	1.90	1.80	1.60	1.60	1.40
Bound Brook, N. J.	2.10	2.30	2.00	1.85	1.70	1.70
Dresser, Wis.	.75	2.45	2.45	2.15	2.00	2.00
Duluth, Minn.	1.00	2.25	2.00	1.50	1.50	1.50
E. Summit, N. J.	2.10	2.35	2.15	1.85	1.80	1.80
Glen Mills and Rock Hill, Pa.	1.60	1.90	1.90	2.25	2.10	1.90
New Britain, Middlefield, Rocky Hill, Meriden, Conn.	.60@1.00	1.60@1.80	1.60@1.80	1.40@1.50	1.20@1.30	1.15
Oakland, Calif.	1.15	1.15	1.15	1.15	1.15	1.15
San Diego, Calif.	.50@.70	1.45@1.75	1.40@1.70	1.30@1.60	1.25@1.55	1.10
Westfield, Mass.	.60	1.35	1.30	1.20	1.10	1.10
Winchester, Mass.	1.60	.85	.85	2.10	1.85	1.60

Miscellaneous Crushed Stone

City or shipping point	Screenings, ¾ inch down	¾ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
Dundas, Ont.—Flint	1.10	1.10	1.10	1.10	1.10	1.10
W. Barre, Pa.—Quartzite	.90	1.20	1.20	1.70	1.35	1.10
Holton and Bolingbroke, Ga.—Granite	.40	2.75	2.50	2.25	2.25	2.25
Little Falls, N. Y.—Syenite	.90	1.30	1.30	1.80	1.60	1.30
Middlebrook, Mo.—Granite	4.00	2.00	2.00	2.00	1.50	1.50
Ottawa, Can.—Granite	5.50	5.00	5.50	5.00	5.00	5.00
Stockbridge, Ga.—Granite	.50	2.00	1.90	1.75	1.75	1.70
White Haven, Pa.—Sandstone	1.20	1.60	1.70	2.00	1.85	1.70

*Cubic yard. †Agrl. lime. ‡R. R. ballast. §Flux. †Rip-rap. a 3-inch and less

Agricultural Limestone

EASTERN:	
Coldwater, N. Y.—Analysis, 56.77% CaCo ₃ , 41.74% MgCo ₃ —70% thru 200-mesh, 95% thru 40-mesh; bags, \$5.00; bulk	3.25
Chaumont, N. Y.—Analysis: CaCo ₃ 95%; MgCo ₃ , 1.14%—Thru 100 mesh; sacks, 4.50; bulk	2.75
Gasport, N. Y.—90% thru 50 mesh, bulk, 2.50; bags	4.25
Grove City, Pa.—Analysis: CaCo ₃ 94.75%; MgCo ₃ , 1.20%—(70% thru 100 mesh); 80 lb. ppr., 5.30; bulk	4.50
Grove, Md.—(50% thru 50 mesh); paper bags, 6.50; bulk	4.50
Hillsville, Pa.—Analysis, CaCo ₃ 96% (70% thru 100 mesh); sacks, 5.00; bulk	3.25
Jamesville, N. Y.—Analysis, CaCo ₃ 89.25%; MgCo ₃ , 5.25%; bulk, 2.75; sacks	4.50
Syracuse, N. Y.—Analysis, 90% carbonates (50% thru 100 mesh, 90% thru 50 mesh); sacks, 3.50; bulk	2.75
Walford, Pa. (50% thru 100 mesh; 60% thru 50; 100% thru 10); sacked, 5.00; bulk	3.25
West Stockbridge, Mass., Danbury, Conn., No. Pownal, Vt.—Analysis: Combined carbonate, 95%—33% thru 200 mesh; 66% thru 100; 100% thru 40. Bulk	3.25
Williamsport, Pa.—Analysis, CaCo ₃ 88-90%; MgCo ₃ , 3-4%—(50% thru 50 mesh); bulk	4.00@5.50
CENTRAL:	
Alden, Ia.—Analysis, CaCo ₃ 99.16%	.80
Alton, Ill.—Analysis: CaCo ₃ 96%; MgCo ₃ 0.75%—50% thru 4 mesh	2.50
Bedford, Ind.—(95% thru 10 mesh) Analysis, CaCo ₃ equivalent 98.5%	2.00
Belleville, Ont.—Analysis, CaCo ₃ 90.9%; MgCo ₃ 1.15% (45 to 50% thru 100 mesh; 61 to 70% thru 50 mesh); bulk	2.50
Chicago, Ill.—Analysis, CaCo ₃ 53.63%; MgCo ₃ 37.51%—90% thru 50 mesh (¾-in. down)	1.25@1.80
Elmhurst, Ill.—(Analysis) CaCo ₃ 35.73%; MgCo ₃ 20.69% 50% thru 50 mesh	1.25
Greencastle, Ind.—(Analysis) CaCo ₃ 98%, 50% thru 50 mesh	2.00
Howenstein, O.—100% thru 10 mesh; 59% thru 50; 39% thru 100	2.75@3.00
Lannon, Wis.—(90% thru 50 mesh) Analysis, 54%, CaCo ₃ ; 44%, MgCo ₃	2.00
Marblehead, O.—(Analysis) CaCo ₃ 95.33% 100% thru 100 mesh, sacks, 5.25; bulk	3.00
Mayville, Wis.—CaCo ₃ , 53.65%; MgCo ₃ , 43.72%	1.75@2.00
McCook, Ill.—Analysis, CaCo ₃ 54.10%; MgCo ₃ 45.04%—100% thru ¾-in. sieve; 78.12% thru No. 10; 53.29% thru No. 20; 38.14% thru No. 30; 34.86% thru No. 50; 22% thru 100	1.50
Milltown, Ind.—(Analysis) CaCo ₃ 94.41%; MgCo ₃ 2.95%; 28% thru 100 mesh; 25.2% thru 200 mesh; 34.4% thru 50 mesh	1.65
Montrose, Ia.—(90% thru 100 mesh), Piqua, O.—Analysis: CaCo ₃ 82.8%; MgCo ₃ 8.2%; neutralizing power in terms of calcium carbonate, 95.3%—50% thru 100 mesh	3.50@5.50
50% thru 50 mesh	1.75@2.00
Ridgeville, Ind.—(Analysis) CaCo ₃ 98%, 100% thru 4 mesh	1.75
River Rouge, Mich.—Analysis: CaCo ₃ 54%; MgCo ₃ 40%; bulk	.80@1.40
Stolle, Ill. (near East St. Louis on I. C. R. R.)—(Thru ¾-in. mesh) Analysis, CaCo ₃ 89.61 to 89.91%; MgCo ₃ 3.82%	2.75
St. Paul, Ind.—Analysis, CaCo ₃ 85%; MgCo ₃ 12%	1.50
Stone City, Ia.—Analysis, CaCo ₃ 98% (50% thru 100 mesh)	.80
Toledo, O.—Analysis, CaCo ₃ 52.72%; MgCo ₃ 43%—(20% thru 100 mesh); 30% thru 50; 80% thru 100; 100% thru 5/32 screen	1.80
Whitehill, Ill.—Analysis, CaCo ₃ 97.12%; MgCo ₃ 2.50%—50% thru 100 mesh	5.00
50% thru 50 mesh	2.25

(Continued on next page.)

Agricultural Limestone

(Continued from preceding page.)

SOUTHERN:	
Cartersville, Ga.—Analysis: 96% combined carbonates—90% thru 100 mesh.....	3.00
Claremont, Va. (Marline)—Analysis, 90.94% CaCo ₃ , 0.31% P., 1.36% Mg., 0.37% K.; bulk.....	4.50
100 lb. ppr. bags.....	6.00
100 lb. cloth bags.....	6.50
Dittringer, Tex.—Analysis, CaCo ₃ , 99.99%; MgCo ₃ , .04%—	2.00
90% thru 100 mesh.....	1.00
90% thru 4 mesh.....	3.00
Grovania, Ga.—Analysis, CaCo ₃ , 95%; MgCo ₃ , none—50% thru 100 mesh.....	2.00
Hopkinsville, Ky.—Analysis, 94.6 to 98.1% CaCo ₃ —Bulk.....	2.50
Knoxville, Tenn.—Pulverized.....	3.00
90% thru 100 mesh.....	3.00
Linnville, Falls, N. C.—Analysis, CaCo ₃ , 53%; MgCo ₃ , 42%—50% thru 100 mesh; sacks, 4.50; bulk.....	3.00
Marion, Va.—Analysis, 90% CaCo ₃ —(50% thru 100 mesh).....	2.50
Memphis Jct., Ky.—(Analysis, CaCo ₃ , 95.31%; MgCo ₃ , 1.12%); average price, 1/4 in. down.....	2.00
Mascot, Tenn.—Analysis, CaCo ₃ , 52%; MgCo ₃ , 38%.....	3.00
(80% thru 100 mesh).....	2.50
(All thru 10 mesh).....	5.00
Paper bags, \$1.50 extra per ton; burlap, 2.00 extra per ton.....	2.50
Maxwell, Va.—Analysis, CaCo ₃ , 76.6%; MgCo ₃ , 22.83%—50% thru 100 mesh; 100 lb. ppr., 7.00; bulk.....	5.00
Ocala, Fla.—Analysis, CaCo ₃ , 98%—(75% thru 200 mesh).....	4.50
Tyrone, Ky.—Analysis, CaCo ₃ , 90%; MgCo ₃ , 4%—90% thru 4 mesh.....	1.75@2.25
WESTERN:	
Cement, Calif.—Analysis, CaCo ₃ , 95%; MgCo ₃ , 2%—(50% thru 50 mesh).....	5.00
Colton, Calif.—Analysis: CaCo ₃ , 95%; MgCo ₃ , 1 1/2% (all to pass 14 mesh)—bulk, 3.50; bags.....	4.50
Sacks, 15c extra, returnable.....	
Kansas City, Mo., Corrigan Sidg—50% thru 50 mesh; bulk.....	2.00
Oro Grande, Calif.—Analysis: CaCo ₃ , 94%; MgCo ₃ , 2%; 85% thru 200 mesh; \$4.00, bulk; bags.....	10.25
Terminus, Calif.—Analysis, 96.4% CaCo ₃ , 1.3% MgCo ₃ —(60% thru 200 mesh; 80% thru 100 mesh; 100% thru 50 mesh); sacks, 6.00; bulk.....	5.25
Tulsa, Okla.—90% thru 4 mesh.....	.65

Miscellaneous Sands

Silica sand is quoted washed, dried and screened unless otherwise stated.

GLASS SAND:	
Berkeley Springs, W. Va.....	3.00@3.50
Bridgeport, N. J.—Washed, 2.50; dried.....	3.00
Cedarville and South Vineland, N. J.—Damp, 2.00; dry.....	2.50
Columbus, Ohio.....	2.50@3.00
Gray Summit, Mo.....	2.50@4.00
Hancock, Md.—Damp.....	2.00
Klondike and Pacific, Mo.....	2.50@4.00
Leesburg, Pa.—Core, and molding coarse.....	3.00
Mapleton, Pa.—Dry.....	4.00
Glass, damp.....	3.00
Massillon, Ohio.....	3.50
Millington, Ill.....	2.25@3.00
Mineral Ridge, Ohio.....	4.00
Montoursville, Pa.—Green, washed.....	2.00@2.75
Morgantown, W. Va.....	3.00@3.25
Oregon, Ill.—Large contracts.....	2.00@2.50
Ottawa, Ill.....	2.50
Pittsburgh, Pa.—Dry, 4.00; damp.....	3.00
Robinson, Md.—Washed, damp.....	2.00
Rockwood, Mich.....	3.00@4.00
Round Top, Md.—Glass and damp, \$2.50; core.....	2.25
St. Marys, Pa.—Green.....	2.75
Sands, Elk Co., Pa.—Selected, green.....	3.00
Thayers, W. Va.—Washed.....	2.60
Tygart, Ky.—Washed, not dried.....	1.75@2.50
Utica, Ill.....	1.75@2.50
Ableman, Wis.—Brass molding and molding fine.....	3.00
FOUNDRY SAND:	
Albany, N. Y.—	
Molding, fine and coarse.....	3.00
Brass molding.....	3.00
Core.....	1.65
Sand blast.....	3.00@5.00
Allentown, Pa.—Core.....	1.75@2.00
Molding coarse.....	1.75@2.00
Arenzville, Ill.—Molding fine.....	1.75@2.00
Beach City, Ohio—Core and glass sand.....	2.25@2.50
Furnace lining.....	2.50@3.00
Molding fine and coarse.....	2.25@2.50

(Continued on next page)

Wholesale Prices of Sand and Gravel

Prices given are per ton, F. O. B., at producing plant or nearest shipping point

Washed Sand and Gravel

City or shipping point	Fine Sand, 1/10 inch down	Sand, 1/4 inch and less	Gravel, 1/2 inch and less	Gravel, 1 inch and less	Gravel, 1 1/2 inch and less	Gravel, 2 inch and less
EASTERN:						
Ambridge, South Heights, Pa.		1.30		1.30	1.00	1.00
Attica, N. Y.	.75	.75	.75	1.00	1.00	1.00
Erie, Pa.		1.00	1.15		1.25	
Farmingdale, N. J.	.48				1.40	
Hartford, Conn.	.90		1.25	1.15	1.15	1.15
Leeds Junction, Me.		.60@.75	2.00	1.75	1.65	1.50
Ludlow, Mass.	.75*	.75*	1.70		1.50*	1.50*
Pittsburgh, Pa.	1.30@1.50				1.00	1.00
Washington, D. C.	.75	.75	2.00	1.40	1.20	1.20
York, Pa.	1.10@1.30		(crushed gravel)			
CENTRAL:						
Alton, Ill.	.60@.75	.60@.75	1.50@4.50	1.30	1.20	1.20
Attica and Covington, Ind.	1.00	1.00	1.00	1.25	1.25	1.25
Anson, Wis.	.60@.75	.60@.75			1.00@1.15	
Barton, Wis.	.70	.70			.70	
Chicago, Ill.	1.75@2.25	1.75@2.43				
Cincinnati, O., and vicinity.....	1.20	1.15		1.15	1.15	2.00
Columbus, O.	.70@1.25	1.10@1.25	.80@1.25	.80@1.25	.80@1.25	.70
Des Moines, Ia.	.75@1.00	.75	1.75	1.75	1.75	1.75
Detroit, Mich.		.70		.85 (64/40)	.95	.95
Earlestead (Flint), Mich.	.60	.70		1.05	.95	.95
Eau Claire, Wis.	.20@.60	.50@.60	1.25@2.25		.90@1.10	
Elkhart Lake, Wis.	.75	.60	1.00	.84	.84	.84
Grand Rapids, Mich.		.60		.90	.85	.85
Greenville, Mechanicsburg, O.	.80	.70	.80	1.00	.85	.80
Humboldt, Ia.	1.00	.85	1.90	1.90	1.90	1.90
Indianapolis, Ind.	.60	.60		1.50	.75	.75
Janesville, Wis.		.80@.95			.85@.95	
Lincoln, Neb.	1.00	.80, sand and gravel	1.30, drained for shipment			1.75
Mason City, Ia.	.90	2.00	1.85			2.00
Milwaukee, Wis.	1.55	1.55	1.60	1.60	1.60	1.60
Minneapolis, Minn.	.50	.50	2.00	1.75	1.75	1.50
Moline, Ill.	1.30	1.30	1.60	1.60	1.60	1.60
Pittsburgh, Pa.	1.30	1.30	1.30		1.00	1.00
Riton, Wis.		.85			.85@1.00	
Saginaw, Mich., f. o. b. cars.....	1.30	1.30	2.20	1.95	1.85	1.85
St. Louis, Mo., f. o. b. cars.....	1.95	1.65	1.85	1.65	1.60	1.60
Summit Grove, Clinton, Ind.	1.00	1.00	1.00	1.00	1.00	1.25
Terre Haute, Ind.	1.00	1.00	1.25	1.25	1.25	1.25
Toledo, Ohio	.75	.75				
Winnipeg, Can.			All sizes	1.20		
Yorkville, Moronts, Oregon and Sheridan, Ill.	.90	.90	.90	.90	.90	.85
SOUTHERN:						
Flomaton, Ala.		1.00		2.25		
Ft. Worth, Tex.	2.00@2.25*	2.00@2.25*	2.75@3.00*	2.75@3.00*	2.75@3.00*	
Jedburg, Mo.		1.05	1.20@1.45	1.00	1.00	.95
Knoxville, Tenn.	1.25	1.25	1.65	1.65	1.65	1.50
Lake Weir, Fla.		.75				
Macon, Ga.		.75@1.00				
Memphis, Tenn.	1.40	1.40	1.50			1.50
N. Martinsville, W. Va.		1.40				1.20
New Orleans, La.	1.00		1.75		1.25	
Pelzer, S. C.	.90					
Pine Bluff, Ark.	1.25	.92				
Tulsa, Okla.		.70				
Waco, Texas	.70@.80	.70@.80				1.10
WESTERN:						
Grand Rapids, Wyo.	.50	.50	.85	.85	.80	.80
Kansas City, Mo.	(Kaw River sand, car lots, .75 per ton, Missouri River, .85)					
Niles, Calif.	1.00	1.00	.90@1.10	.85@1.00	.85@1.00	.85@1.00
Porteau, B. C.	1.30	1.30	1.30			1.20
Pueblo, Colo.		.90				1.20
Roseburg, Ore.	2.00	1.75	2.00	1.75	1.75	1.75
San Diego, Calif.	.80@1.00	.80@1.00	1.30@1.60	1.25@1.55	1.25@1.45	1.10@1.40
San Francisco, Calif.		1.00	1.00@1.20	.85@1.00	.85@1.00	.85@1.00
Saratoga, San Jose, Calif.	.60@.75	.60@.75	.60@.75	.60@.75	.60@.75	.60@.75
Seattle, Wash.	1.25	1.25	2.00		1.25	1.25
Vancouver, B. C.		1.30*		1.30*		1.20*

Bank Run Sand and Gravel

City or shipping point	Fine Sand, 1/10 inch down	Sand, 1/4 inch and less	Gravel, 1/2 inch and less	Gravel, 1 inch and less	Gravel, 1 1/2 inch and less	Gravel, 2 inch and less
EASTERN:						
Boonville, N. Y.	.60@.80		.55@.75		1.00*	1.00
Glenville, N. Y.						
Hartford, Conn.		1.00*				
Yardville, N. J.	.50@.75					
York, Pa.	1.00@1.30					
CENTRAL:						
Attica, Covington, Silverwood, Ind., and Palestine, Ill.	.85	.85	.85	.85	.85	.85
Cherokee, Hawarden, Ia.		.80 per ton—1.20 washed				
Elkhart Lake, Wis.	.70	.60	.60			
Ft. Jefferson, Mechanicsburg, O.	.60			.60	.75	
Hersey, Mich.		.65				
Janesville, Wis.						.85@.95
Oxford, Mich.		.75	1.30	1.30	1.30	1.30
Saginaw, Mich., f. o. b. cars.....						1.75
St. Louis, Mo., f. o. b. cars.....	.65	.65	.65	.65	.65	.65
Summit Grove, Ind.						
Yorkville, Oregon, Moronts and Sheridan, Ill.						.80@.90
SOUTHERN:						
Albany, Ga.	.70@1.00					
Dundley, Ky. (Crushed Sand)		1.15		1.10	.60	
Lindsay, Tex.						.60@.75
Valde Rouge, La.				1.50		1.30
Waco, Texas		.80				
WESTERN:						
Roseburg, Ore.	1.75	1.50	1.75	1.50	1.50	1.50
Saratoga, San Jose, Calif.		.60@.75	.60@.75	.60@.75	.60@.75	.60@.75

* Cubic yard. B Bank. L Lake. H Ballast.

Crushed Slag

City or shipping point	Roofing	¾ inch down	¾ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
EASTERN:							
Bethlehem and Emaus, Pa.	2.50	.90	1.50	1.20	1.20	1.20	1.20
Buffalo, N. Y.	2.35	1.25	1.25	1.25	1.00@1.25	1.25	1.25
E. Canaan, Conn.	3.50	1.10	2.50	1.35	1.25	1.25	1.25
Eastern Pennsylvania and Northern New Jersey	2.50	.90	1.50	1.10@1.25	1.10@1.25	1.10@1.25	1.10@1.25
Eric, Pa.	2.25	1.25	1.25	1.25	1.25	1.25	1.25
Emporium, Pa.	2.25	1.25	1.25	1.25	1.25	1.25	1.25
Hokendaugua and Donaghmore, Pa.	2.50	.90	1.50	1.20	1.20	1.20	1.20
Lebanon, Pa.	2.50	.85	1.50	.85	.85	.85	.85
Sharpville and Struthers, Pa.	2.00	1.30	1.70	1.30	1.30	1.30	1.30
Western Pennsylvania	2.50	1.25	1.25	1.25	1.25	1.25	1.25
CENTRAL:							
Chicago, Ill.		All sizes, \$1.50, F. O. B. Chicago					
Detroit, Mich.		All sizes, 1.65, F. O. R. Detroit					
Ironton, Jackson, O.	2.00	1.40	1.70	1.40	1.40	1.40	1.40
Toledo, O.	2.20	1.70	1.95	1.95	1.95	1.70	1.70
Youngstown, Dover, Hubbard and Leontonia, O.	2.00	1.30	1.70	1.30	1.30	1.30	1.30
SOUTHERN:							
Alabama City, Ala.	2.05	1.00	1.25	1.25	1.25	1.00	.95
Ensley, Ala.	2.05	1.00	1.25	1.25	1.25	1.00	.95
Longdale, Goshen, Glen Wilton and Low Moor, Va.	2.50	1.00		1.25	1.25	1.15	1.05

Agricultural Lime and Hydrate

	—Agricultural Lime— Bulk	Bags	Per Cent CaO	Per Cent MgO	Agricultural Hydrate Bags
EASTERN:					
Adams, Mass.		7.50@8.00	98	18	
Bellefonte, Pa.	10.50		98.8	.72	
Berkeley, R. I.		5.50	50	18	15.00
Branchton, Pa.		8.00	92.36	1.08	
Cassadaga, N. Y.—Maritime	8.00	10.00			
Cavetown, Md.	8.50				
Cedar Hollow, Devault, Rambo and Swedeland, Pa.	10.50		45.50	30.50	13.00
Chippewa, Pa.	6.00@6.50		78.67	1.33	
Farnams, Mass.	6.50	8.00	60	2	
Frederick, Md.	7.75		88	5 to 8	10.50
Grove, Md.	8.00				10.75
Highgate Springs, Vt.	6.00		85	2	8.00
Hyndman, Pa.	5.00	8.50	80.23	2.87	
Lime Kiln, Md.	9.50	13.50			13.50
Lime Ridge, Pa.	5.25@6.50		80.56-62.56	3.87-1.75	
Mt. Union, Pa.	6.25		93.69	38	
Newburgh, N. Y.		37			8.00
New Castle, Pa.	3.50	4.50	47.6 to 50.4	0.62 to 1.12	
Paxtang and Lemoyne, Pa.	4.00@6.00		60	12	
Rosendale, N. Y.	8.00	9.00	92	5	
Union Bridge, Md.	11.00	5.50	73	1	13.00
Williamsport, Pa.	6.25	12.00	84.87	2-3	12.00
West Rutland, Vt.	5.00	8.00	68	3	
West Stockbridge, Mass.	3.35	5.35			12.00
York, Pa.	10.75	13.00	92	5	13.00
CENTRAL:					
Alton and Hannibal, Ill.	11.50		95		
Delaware, O.			50.0	5.12	11.50
Knowles and Valders, Wis.	4.00	9.00	55	45	13.00
Manistique, Mich.	11.00		95	2	11.00
Marblehead, O.			54	16	13.00
Mitchell, Ind.					13.50
Sheboygan, Wis.	5.50	8.50	58	40.5	
Woodville, Ohio			20	60	11.25
SOUTHERN:					
Blowers, Fla.	5.50		98		
Burns, Tenn.	10.00		96	0.54	14.00
Chippewa, Fla.	5.00		80.0	15.0	
Claremont, Va. (Marl.)	5.00	7.00	85.95	2.5	
Dittlinger, Texas	11.00	9.00@11.00	98.62	0.29	12.50@15.00
Erin, Tenn.	12.00		97.82	0.12	
Knoxville, Tenn.	9.00		98.5	.05	15.00
Lushing, Va.	6.50	11.25	60	15	12.75
Maxwell, Va.	10.00		84		6.50
Newala, Ala.	4.00	6.00 pulv.	99.33		
Ocala, Fla.	9.00	11.50	98½ (dry basis)	15.00	
Staunton, Va.			80.00		
WESTERN:					
Colton, Calif.			97	2	15.00
Kirtland, N. Mex.	12.00		97	0.33	15.00
San Francisco, Calif.	6.00	8.00	96	2	
Tachapi, Cal.	6.50	8.57	95	2.16	
Orofino, Idaho					

Miscellaneous Sands

(Continued from preceding page)

Bowmantown, Pa.—Core	1.35@1.50
Molding, coarse	1.80
Reidreton, N. I.—Core	2.00
Cleveland, O.—Molding coarse	1.50@2.00
Brass molding	1.50@2.00
Molding fine	1.50@2.00
Core	1.25@1.50
Columbus, O.—Core	1.00@3.00
Brass molding	3.50@4.00
Glass sand	3.00
Molding fine and coarse	2.25@2.50
Connecticut, O.—Molding fine	2.00@2.25
Molding coarse	2.00
Delaware, N. J.—Molding fine	1.90
Molding, coarse	2.15
Brass Molding	.70
Eau Claire, Wis.—Core	3.00@4.25
Sand blast	2.25
Fleetwood, Pa.—Furnace lining	
Franklin, Pa.—Traction	2.25
Brass molding	2.50
Core	3.00
Molding fine	3.00
Molding coarse	3.00
Sand blast	5.00
Greenville, Ill.—Molding coarse	2.00@2.25
Hancock, Md.—Core and brass mldg.	1.65
Hellam, Pa.—Core	2.00@2.50
Joplin, Mo.—Stone sawing, flint	1.25
Kansas City, Mo.—Missouri River core	.80
Klondike and Gray Summit, Mo.—Molding fine	2.00@3.00
Mapleton, Pa.—Core, furnace lining, molding fine and coarse damp	2.50
Core, furnace lining, moulding, fine and coarse, dry	3.00
Massillon, O.—Molding fine	4.00
Core and molding, coarse	3.50
Glass sand	4.00
Traction	3.50
Furnace lining	4.00
Michigan City, Ind.—Core, bank	.75

Millington, Ill.—Glass and core	2.25
Core sand	2.25
Furnace lining	2.50
Roofing sand	2.25
Stone sawing	2.25
Mineral Ridge, O.—Core, molding, sand blast, roofing, etc., washed, screened (damp)	3.25
Montoursville, Pa.—Core and traction	1.50@2.00
Brass molding	1.75@2.25
Glass sand	2.00@2.75
New Lexington, O.—Molding fine	3.25
Molding coarse	2.75
Oregon, Ill.—Core, furnace lining, molding fine and coarse	2.75
Sand blast	3.50
Ottawa, Ill.—Crude silica sand	1.25@1.75
Ottawa, Ill.—Core, furnace lining, steel molding	3.00
Glass sand	2.50@3.00
Roofing sand	2.50@3.00
Ridgeway, Pa.—Glass sand, green	2.25
Glass sand, wash	2.25
Molding, fine and coarse	1.20
St. Peter, Minn.—Glass sand	2.25
Core sand	2.25
Brass molding	2.25
Molding fine	2.25
Rockwood, Mich.—Glass sand, core, roofing, stone sawing	3.50@4.00
Sand blast	3.50@4.00
Thayer, Pa.—Traction	2.25
Furnace lining	1.40
Molding fine and coarse	1.25@1.50
Core, steel	2.50@3.00
Tygart, Ky.—Core and stone sawing	2.60
Fire-brick sand, washed but not dried	2.15@2.40
Utica, Pa.—Core	3.00
Molding fine	3.00
Molding coarse, traction	3.00
Brass molding	3.00
Warwick, Ohio—Core, furnace lining, molding fine and coarse (dry)	2.75
Same, green	2.50
Wedron, Ill.—Core (crude silica)	1.25
Molding fine	1.50
Furnace lining	1.50
West Albany, N. Y.—Molding fine	2.50
Molding coarse	2.50
Brass molding	2.50
Zanesville, Ohio—Molding fine and coarse	2.50@3.00
Molding coarse	2.25@2.50

Crushed Gypsum

Castalia, O.—Crushed, to cement mills	4.50
Ft. Dodge, Ia.—Bulk	4.00
Grand Rapids, Mich.—Crushed gypsum rock	4.00
Gypsumville, Man., Can.—Crushed	3.50
Oakfield, N. Y.	4.00
Gypsum, O., and Akron, N. Y.	4.50@5.50
Saltville, Va.	4.50

(Gypsum) Land Plaster

Castalia, O.—Land plaster	6.00
Bags extra—Jute, 3.00; ppr., 1.00.	
Garhutt, N. Y.—Land plaster, bags	8.00
Bags extra	
Grand Rapids, Mich.—Ground gypsum rock	5.00
Mound House, Nev.—Ground gypsum rock	7.50@8.00
Sacks, 25 extra	
Oakfield, N. Y.—Ground Gypsum rock	8.00
Plasterco, Tex.	12.00
Sandusky, O.	6.00
Jute, 3.00 extra; ppr., 1.00 extra.	
Los Angeles, Calif.	12.40@14.40

Ground Rock Phosphate

Centerville, Tenn.—B. P. L., 70%; ton, 2000 lbs. (90% thru 100 mesh)	9.00@10.00
Lump rock, 72% to 75%, B. P. L.	6.00@8.50
Centerville, Tenn.—B. P. L., 65%	8.25
B. P. L., 70%	9.00@10.00
Brown rock, 75% and better	12.00
Gordonsburg, Tenn.—2000 lbs. (90% thru 100 mesh)—B. P. L., 60%	6.00
B. P. L., 65%	7.00@9.50
B. P. L., 70%	9.50
B. P. L., 72%	9.50
B. P. L., 75%	12.00
Lump rock, long ton, 65-70%	7.00@9.00
Mt. Pleasant, Tenn.—(B. P. L. 68%) 14% phosphorus	7.50@9.00
14% phosphorus	8.00
Mt. Pleasant, Tenn.—B. P. L., 65-70%	7.00@9.00
Norwills, Fla.—Fla. Hard Rock (B. P. L., 68%)	10.00
Wales, Tenn.—(B. P. L., 70%)	8.00

Florida Soft Phosphate

Bartow, Fla.—B. P. L., 60% bulk	10.00
Croon, Fla.—Ground pebble, 30%	16.00
Pulverized soft, 26%	17.50
Jacksonville (Fla.) District	10.00@12.00
(Add 2.50 for sacks)	
Norwills, Fla.—B. P. L., 60% bulk	10.00
Phosline, Fla. (in burlap bags)	15.00
Morrison, Fla. (24% phosphoric acid)	16.00

Portland Cement

Current warehouse prices, carload lots at principal cities, without bags:

New York (del.)	\$4.10
Jersey City (del.)	3.55
Boston	3.63
Chicago	2.35
Pittsburgh	2.42
Cleveland	2.73
Detroit	2.78
Indianapolis	2.61
Toledo	2.71
Milwaukee	2.59
Duluth	2.35
Peoria	2.63
Cedar Rapids	2.71
Davenport	2.67
St. Louis	3.45
San Francisco	3.00
New Orleans	3.50
Minneapolis	3.45
Denver	2.76
Kansas City	3.12
Seattle	3.85
Dallas	3.85
Atlanta	3.75
Cincinnati	3.32
Los Angeles	3.10
Baltimore (del.)	4.08
Montreal (including bags)	3.00
Detroit	3.52

NOTE—Bag charge is generally 25c each.

Natural Cement

Current price for 500 bbl. or over, f.o.b., exclusive of bags:

Minneapolis (Rosendale)	Current \$1.85
Kansas City (Ft. Scott)	1.60
New Orleans	3.36
Atlanta (Magnolia)	1.90
Cincinnati (Louisville)	2.85
Boston (Rosendale)	2.35

Roofing Slate

The following prices are per square (100 sq. ft.) for slate, f. o. b. cars, quarries, Bangor, Penn.

No. 1 Clear Slate

Sizes	Price
24x14	10.85
24x12	10.85
22x12	11.55
22x11	11.55
20x12	11.55
20x10	12.60
18x12	11.90
18x10	12.60
18x9	12.60
16x12	11.90
16x10	12.60
16x9	12.60
16x8	12.60
14x10	11.90
14x8	11.90
14x7	11.20
12x10	11.20
12x8	11.20
12x7	11.20
12x6	11.20
10x8	9.10
10x7	9.10
10x6	9.10

No. 2 Clear

24x12	8.75
22x11	8.75
20x10	9.45
18x10	9.45
18x9	9.45
16x8	9.10
14x10	9.10
14x8	9.10

No. 1 Odd Sizes

18x18	13.30
16x16	13.30
14x14	13.30
12x12	13.30

The following are the prices per square for slate, f.o.b. cars quarries, Granville, N. Y., the prices given in each case being for No. 1 Sea Green Roofing Slate:

22x11, 20x12, 20x11, 20x10, 18x12, 18x10, 18x9, 16x12, 16x10	11.90
16x12, 16x10	11.90
24x12, 22x12, 16x9, 16x8, 14x12, 14x10	11.55
26x14, 24x14, 22x14, 20x14	11.20
14x9, 14x8, 12x10	10.50
14x7, 12x9, 12x8	9.80
12x7, 11x8, 11x7, 10x8	9.10
12x6, 10x7	8.40

Granulated slate per net ton, f. o. b.

quarries, Vermont and New York, 7.50@12.00.

Lime

Warehouse prices, carload lots at principal cities.

	Hydrate per Ton	
	Finished	Common
New York	\$21.00	\$20.00
Chicago	27.20	26.20
St. Louis	27.00	21.00
Boston	28.00	27.00
Dallas		25.00
Cincinnati	17.60	17.60
San Francisco	27.50	22.00
Minneapolis	28.00	21.00
Denver	32.00	
Detroit	22.00	19.00
Seattle	30.00	
Los Angeles	2.75†	2.20†
Baltimore	23.50 (East)	
Montreal	25.00	25.00
Atlanta		
New Orleans	24.50	24.50
	Lump per 200-lb. Barrel	
	Finished	Common
New York	\$ 3.80 at plant	\$ 3.60*
Kansas City	2.50	2.40
Chicago		1.65
St. Louis		2.75
Boston		3.95†
Dallas		2.50†
Cincinnati		2.10†
San Francisco		2.25
Minneapolis	2.10	1.80
Denver	1.05 (bu.)	
Detroit	2.00†	1.80†
Seattle	2.85†	
Los Angeles	2.75†	2.00†
Baltimore		13.00†
Montreal	15.00†	15.00†
Atlanta	3.00†	2.75†
New Orleans	3.00	2.85

*300-lb. barrels. †Per 180-lb. barrel. ‡Per ton. NOTE—Refund of 10c per barrel with 25c per ton off on hydrated.

Talc

Prices given are per ton f. o. b. (in carload lots only) producing plant, or nearest shipping point.

Baltimore, Md.—Crude talc	4.00
Cubes	60.00
Blanks, per lb.	.08
Henry, Va.—Crude talc (lump mine run), per 2000-lb. ton	3.25@ 3.50
Ground talc (20-50 mesh), bags	8.75
Ground talc (150-200 mesh), bags	13.50
Chester, Vt.—Ground talc (150-200 mesh), bulk, 10.50@12.00; bags	12.00@14.00
Chatsworth, Ga.—Crude talc	8.00@10.00
Ground talc (150-200 mesh), bags	12.50
Pencils and steel workers' crayons, per gross	1.50@ 2.00
Rochester and East Granville, Vt.—Ground talc (20-50 mesh), bulk	8.50@10.00
Ground talc (150-200 mesh), bulk	10.00@22.00
Waterbury, Vt.—Ground talc (20-50 mesh), bulk	8.50
Ground talc (150-200 mesh), bulk, 10@15.00 and	10.00@15.00
Pencils and steel workers' crayons, per gross	2.00
Biltmore, N. C.—Ground talc (150-200 mesh), 200-lb. bags	15.00@30.00
Pencils and steel workers' crayons, per gross, 1.25@1.45 and	1.55@ 1.60
School crayons, per gross	1.15@ 1.20
Roller mill crayons, per gross	1.75@ 1.90
Keeler, Calif.—Ground talc (150-200 mesh), bags	18.00@40.00
Gouverneur, N. Y.—Crude talc	4.00@ 5.50
Ground talc (150-200 mesh)	20.00@28.00
Johnson, Vt.—Ground talc (20-50 mesh), bulk	8.50
Bags	10.00
Ground talc (150-200 mesh), bulk	10.00
Bags	21.00
Los Angeles, Calif.—Ground talc (20-50 mesh) 200-lb. bags	12.00
Ground talc (150-200 mesh) 200-lb. bags	20.00

Sand-Lime Brick

Prices given per 1,000 brick f. o. b. plant or nearest shipping point, unless otherwise noted.

Michigan City, Ind.	14.00@15.00
Milwaukee, Wis. (delivered at job)	18.50

Barton, Wis.	15.00
South Dayton, Ohio	16.00
Albany, Ga.	16.00
Brighton, N. Y.	20.50
Buffalo, N. Y.	16.50
Winnipeg, Can. (less \$1 trade disc.)	19.00
Boston, Mass.	19.00@21.00
Syracuse, N. Y. (delivered at job)	27.00
F. o. b. cars, plant	23.00
Washington, D. C.	15.50
Portage, Wis.	30.00
San Antonio, Texas—Common	18.00@22.00
Face	25.00@32.00
Boise, Idaho (in yard)	18.00
El Paso, Texas	16.00
Rochester, Mich.	13.00
Bloomfield, Ont., Can.	18.00
Plant City, Fla.	17.00

New York City Sand and Gravel Men Accused

FEDERAL INDICTMENTS charging violation of the Sherman anti-trust act were returned December 29 against four sand concerns and 11 individuals whose activities have been scrutinized in connection with the "building trust" investigation in New York City. The corporations indicted are the Goodwin-Gallagher Sand and Gravel Corporation, Manhattan Sand Co., Inc., Colonial Sand and Stone Co., Inc., and the Lenox Sand and Gravel Co., Inc.

Railway Induces Farmers to Store Agricultural Lime

CO-OPERATING WITH the county farm bureaus and the agricultural agents in their educational campaign among farmers to induce them to use lime and fertilizer more freely, the Baltimore and Ohio Railroad has arranged to lease to farmers small tracts of land along its lines for the storage of agricultural lime.

Leases will be made at a nominal rental on small tracts adjacent to the railroad's team tracks or to other sidings at various stations where such land is available. They will afford the farmers opportunity to obtain lime without paying demurrage charges.

The State of Pennsylvania recently issued a bulletin on the lime requirement of the soils in this State and it is with a view to overcoming any obstacle in the way of stimulating the increased use of fertilizer that the railroad is acting in granting the leases.

International Cement Shows Increased Profits

THE International Cement Corp., Spokane, Wash., reports for the quarter ended Sept. 30, net income after charges and taxes of \$654,102, equal to \$2.43 a share of the outstanding capital stock, compared with net income of \$547,591, \$2.09 a share in the preceding period. Net income for the first nine months of the year 1920 amounts to \$1,427,039, equivalent to \$5.31 a share. Total sales for the September quarter were \$2,569,011, an increase of \$271,443 over the previous quarter. Net profits for the period were \$892,402, an increase of \$26,602.



News of the Industry



Incorporations

The Peoples Coal & Builders Supply Co., Flint, Mich., has been incorporated with a capital stock of \$150,000.

The Bedford Carthage Stone Co., Tulsa, Okla., is arranging for an increase in capital to \$30,000 for proposed expansion.

Maurice River Sand Co., Camden, N. J., has been incorporated for \$100,000 by F. R. Hansell, L. C. Chow and J. A. MacPeak.

The Building Material Co., Wilson, N. C., has been incorporated with a capital stock of \$250,000, by W. R. Wyatt, of Wilson; A. B. Consolve and A. D. Pvermyer of Norfolk, Va.

The Ozark Quarries Co., Carthage, Mo., has been chartered with a capital stock of \$100,000. The company's attorney is B. H. Esterly, Bank of Carthage Bldg., Carthage, Mo.

Mutual Lime Co., Winchester, Va., has been incorporated for \$500,000 by F. W. White, Pres.; Herbert M. Kaufmann and Moses Bigelow of New York to quarry and deal in limestone.

The Newport Mining and Mica Co., Boston, Mass., has been incorporated for \$150,000 by Edw. J. Bartlett, Pres.; B. C. Hamon, 795 Columbia Rd., Dorchester, Treas., and W. B. Jefferson.

The State Sand and Gravel Co., Milwaukee, Wis., has been incorporated for \$2,000 to operate sand and gravel pits and to deal in sand and gravel by A. H. Fischer, N. C. Ford and W. E. Ford.

The Northern Equipment Co., Duluth, Minn., has been incorporated for \$50,000 to own and work gravel pits, quarries, mines, etc., by Geo. A. Merritt, Pres.; E. L. Merritt, Vice-Pres., and B. McIntyre, Sec'y-Treas., all of Duluth.

The Western Lime and Cement Co., Milwaukee, Wis., has been incorporated for \$1,500,000 to manufacture and deal in lime, stone, cement, plaster, and other building materials by E. I. McIntyre, Arthur Snapper and John Rupp.

Crown Sidewalk and Block Co., Minneapolis, Minn., has been incorporated for \$50,000 to manufacture cement blocks and to deal in cement, sand and gravel by E. W. Anderson, P. L. Anderson and H. A. Anderson, all of Minneapolis.

Giant Crushed Stone Co., Des Moines, Ia., has been incorporated for \$200,000 to engage in the crushed stone and stone products business. F. C. Nisson, is Pres. and Treas., and F. T. Jensen, Vice-Pres. and Sec'y, both from Des Moines.

Anderson Granite Co., Morton, Minn., has been incorporated for \$100,000 to quarry rock and granite and prepare same for market by J. W. Anderson, Pres., Morton; Eric Mitchell, Vice-Pres., Minneapolis, and F. E. Sylvester, Sec'y-Treas., Olivia.

Clear Lake Sand and Gravel Co., Clear Lake, Ia., has been incorporated for \$200,000 to engage in sand, gravel and building material business. The officers are E. H. Rich, Pres.; H. D. Keerl, Vice-Pres.; R. R. Rogers, Sec'y. and W. F. Rich, Treas., all from Clear Lake.

Sand and Gravel

The Cadillac Sand and Gravel Co., Toledo, O., has increased its capitalization from \$50,000 to \$100,000.

The Roquemore Sand & Gravel Co. has been incorporated in Montgomery, Ala., with a capital of \$250,000 to develop sand and gravel deposits, and plan a daily output of 30 to 40 cars.

J. W. and George Woodruff, Columbus, Ga., operating a local sand and gravel plant, are planning for enlargements for increased production. Additional equipment will be installed.

The Nugent Sand Co., Louisville, Ky., had its plant and elevator at the foot of Clay St. damaged by fire on Nov. 17. The fire did damage to an extent of \$10,000 to the buildings and hoisting machinery.

The A. B. C. Sand & Gravel Co., recently incorporated in Tulsa, Okla., with a capital of \$10,000, has selected the following officers: C. T. Smith, president; S. J. Wick, vice-president and manager; E. D. Rhodes, secretary and treasurer.

The Granite Sand and Gravel Co., Indianapolis, Ind., has increased its capitalization to \$70,000.

The West Jersey Sand and Supply Corporation, Westville, N. J., will be sold under the direction of Wolf, Block and Schorr, Philadelphia, Pa., attorneys representing the company. The property comprises over 80 acres of land, of which about 38 acres have been utilized for plant and sand properties. The works consist of the complete sand washing plant, including steam shovel, industrial locomotive, power plant and pumping equipment.

Eddyville, Ia.—The stockholders of the Morey Sand and Gravel Co. have changed the name of the company by a vote of the stockholders to the Eddyville Sand and Gravel Co. Wm. Hankins was recently elected as a member of the board of directors, to take the place of Wm. Seeds. It was also voted to change the board of directors from five to seven members. The company has had a good business since they started shipping material in July. Everything points to a record-breaking business for next year, as practically all of the work of construction will be completed before the spring months.

Quarries

The Detroit Marble Co., of Detroit, Mich., has increased its capital stock from \$25,000 to \$100,000.

The Golden Rule Granite Co. has been incorporated in Rapid City, S. D., with a capital stock of \$100,000, by Clarence C. Langdale and Wm. Fay Richards.

The Casparis Stone Co., Casparis, near Connelville, Pa., has dismissed a large number of employees, and will operate on a considerably curtailed basis until the market improves.

The American Limestone Co., Knoxville, Tenn., manufacturers of pulverized limestone, has completed an additional limestone pulverizing plant at Mascot, Tenn., with a daily capacity of 30 cars.

The Chehaw Crystal Sand & Gravel Co., Montgomery, Ala., recently organized with a capital of \$200,000, has plans under way for the operation of a plant at Chehaw, Ala. The company has an extensive tract of gravel properties at this place.

The Indiana Sand Co., Bridgeman, Ind., a newly organized company has started activities by building a spur track from their plant to the main line. The holdings of the company comprise a good acreage of fine quality sand used largely in glass factories in Indiana.

The Beaver Dam Marble Quarries, Cockeysville, Md., have been leased by Antonio T. Carozza, Catonsville, Md., and associates. The new organization plans for the early operation of the properties, and will make a number of extensions and improvements. It is proposed to develop an annual capacity of about 50,000 cu. ft. of marble.

The H. W. Johns-Manville Co., Madison Avenue and Forty-first Street, New York, will soon commence the installation of equipment at its limestone properties at Plymouth Meeting, Pa., recently acquired. Initial work is under way, including ground clearing, etc. The production will be used at the company's mills for the manufacture of different building specialties.

The Federal Crushed Stone Co., Jasper, Minn., is one of the plants being erected to meet the great demand for crushed stone for paving purposes in Minnesota. This is a concern employing 75 men, with a monthly pay roll of \$15,000. About \$150,000 is invested in the plant, and it turns out 1,000 tons of crushed rock a day in addition to the by-products of pebble dash and dust.

The Monmouth Stone Co., Gladstone, Ill., inaugurated its activities on Dec. 15 with a big blast in which 5 tons of dynamite was used and which broke loose about 75,000 to 100,000 tons of limestone. The company anticipates a big business in material for road building, limestone, fertilizer and limestone marble, in view of the prospects already in sight and of the fine equipment which the company has for taking care of its patrons' needs. The company also owns hundreds of thousands of tons of fine moulding sand which is also a part of the Gladstone holdings, much of which has already been sold with a ready market for the product to be found.

The White Oak Crushed Stone Co., New Britain, Conn., has filed notice of dissolution under state laws.

The Rock Products Co., Sugar Land, Tex., has acquired about 16,000 acres of property at Rock Junction, La., and plans for the operation of a large sandstone quarry. It is proposed to install machinery and commence operations at an early date. The company was recently incorporated under Louisiana laws with a capital of \$100,000. L. S. Bourne and R. P. Eldridge, both of Sugar Land, are president and secretary, respectively.

The Eastern Limestone Corp., a subsidiary of the Eastern Potash Corp., 120 Broadway, New York, has perfected arrangements for the issuance of bonds for \$400,000, the proceeds to be used for general expansion and operations. The company is engaged in quarrying limestone at properties in New Jersey and has a tract of land estimated to contain about 100,000,000 tons of material. It is proposed to develop a capacity of 1500 tons of limestone per day and this entire output will be utilized by the parent corporation at its new potash works now in course of construction at New Brunswick, N. J. This latter plant will be devoted to the manufacture of potash for agricultural and chemical purposes, with by-products to include lime and other materials. The company will also operate an affiliated chemical plant in this same district. Waldemar Schmidt-mann is president of both corporations, and was at one time connected with the International Agricultural Corporation, being an organizer of such company.

Concrete Products

The Detroit Concrete Co., of Detroit, Minn., is remodeling its plant.

The Badger Concrete Co. has begun work on its factory on Marion Street, in Oshkosh, Wis.

The Montrose Cement Products Co., of Montrose, Ark., has increased its capital stock from \$10,000 to \$15,000.

The Cementile Roofing Corp. has been organized in Norfolk, Va., with A. LeB. Ribble, president; H. D. Griffin, vice-president; E. B. Griffin, secretary.

The Ribstone Concrete Corp., Batavia, N. Y., manufacturer of concrete building products, has increased its capitalization from \$20,000 to \$50,000 for proposed business expansion.

The Richmond Cement Products & Machinery Co., Richmond, Minn., has been incorporated with a capital stock of \$100,000, by Joseph Vogt, and John Willenbring, to deal in cement products.

The Waupaca Concrete Products Co. has been incorporated in Waupaca, Wis., with a capital of \$30,000, to handle sand, gravel, etc., in both a wholesale and retail manner. Wm. A. Hanson and A. E. Woody are incorporators.

The Shope Brick Co. of Wisconsin, Milwaukee, Wis., a corporation recently completed, is completing the erection of a manufacturing building 70 ft. x 140 ft. in size, of concrete and brick wall construction costing approximately \$35,000. The complete plant will comprise several buildings, all of modern design and construction for the production of the famous Shope brick.

Manufacturers

American Road Machinery Co., Kennet Square, Pa., has just issued a new catalogue describing and illustrating "Champion" rock crushers, special elevators, screens, conveyors, rock drills, etc.

The Marathon Mill and Machinery Co., announces the removal of its main office and works to Champaign, Ill., but retaining an enquiry office in the First National Bank Bldg., Chicago, Ill.

It has been announced that the interests of the Long Powder and Supply Co., Ashcraft Transfer Co. and Empire Powder Corp., have consolidated the manufacturing, sales and distributing organizations and are now combined for the betterment of the product and service, and will hereafter operate under the name of the Union Explosives Co., 606-610 Goff Bldg., Clarksburg, W. Va.



Rates for advertising in the Used Equipment Department: \$2.50 per column inch per insertion. Minimum charge, \$2.50. Please send check with your order. These ads must be paid in advance of insertion.

Repaired Contractors' Equipment

Steam Shovels

Model 60 Marion Shovels, 2½-yard dippers, Nos. 1999, 2059, 2130

1—Model 1 Thew, on railroad trucks, ⅞-yard dipper.

1—Bucyrus Model 70-C, Shop No. 1219.

We have a large stock of thoroughly repaired Construction Equipment of all kinds ready for immediate shipment.

Locomotives

8—18-ton, 10x16" Porter Dinkeys, 36" gauge.

2—12-ton, 9x14" Porter Dinkeys, 36" gauge.

1—17x24", 55-ton, 4-6-0, standard gauge.

3—25-ton Forney type.

Clam Shell Buckets

1—1¼-yard Williams Hercules Bucket.

Cars

30—Western Air Dump 12-yard, standard gauge.

40—Western 4-yard, 36" gauge, steel beam.

H. KLEINHANS COMPANY

Union Arcade

Pittsburgh, Pa.

Locomotives for Rent or Sale

- 2—50-ton 18x24 in. six-wheel switchers.
- 1—Marion 76 steam shovel, No. 3503.
- 1—Lidgerwood dragline, 60-ft. boom, 2-yd. bucket.
- 1—40-ton Vulcan four-driver saddle-tank.
- 2—18-ton and 14-ton 36-in. gauge Vulcans.
- 2—10-ton 7x12 in. 36-in. gauge Vulcans.
- 1—10-ton 36-in. gauge Shay geared.

Miscellaneous

- 1—Marion 35 steam shovel on traction wheels.
- 1—Marion 76 steam shovel, No. 3503.
- 1—Lidgerwood dragline, 60-ft. boom, 2-yd. bucket.
- 100—60,000-lb. capacity box cars, 40-ft. long.
- 40—60,000-lb. capacity flat cars, 36-ft. long.
- 13—6-yd. dump cars, 4-ft. 8½-in. gauge.
- 12—1½-yd. "V" steel dump cars, 36-in. gauge.
- 1—Western standard gauge spreader.
- 2-in., 4-in., and 6-in. simple, duplex, and centrifugal pumps, 10 H.P. and 45 H.P. upright boilers, tripod drills, etc.

LOCOMOTIVE CRANES, RAILWAY EQUIPMENT, etc.

INDUSTRIAL EQUIPMENT CO.
McCormick Building, Chicago, Ill.

FOR SALE

8 and 9 K CRUSHERS

Regular drive. Guaranteed.

75 H.P. FLORY ELEC. HOIST

440 V. 60 Cy. 3 Ph. A. C. slip ring motor

ROSS POWER EQUIP. CO.

Indianapolis, Ind.

Machinery For Sale

DRYERS—Direct-heat rotary dryers 3x25 ft., 3½x25 ft., 4x30 ft., 5½x50 ft., 6x50 ft., and 7x80 ft., double shell dryers 4x20 ft., 5x30 ft., and 6x35 ft., steam-heated air rotary dryers 4x30 ft. and 6x30 ft.

KILNS—Rotary kilns 8x110 ft., 6x60 ft., 3½x25 ft., and 3x25 ft.

MILLS—8x8 ft., 6x5 ft., 2½x3 ft., 3x3½ ft., pebble mills; 8x8 ft., 6x6 ft., 5x4 ft., 4½x3½ ft., 2½x2½ ft. ball mills; 3 ft. Marcy mill; 42 in., 33 in., and 24 in. Fuller-Lehigh mills; 4½x20 ft., 5x11 ft., 5x22 ft., and 6x20 ft. tube mills; 7½x13 in., 9x15 in., 16x10 in., 20x6 in., and 30x60 in. jaw crushers; one "Infant" No. 00, No. 0, No. 2, No. 3, and No. 9 Williams' swing hammer mills; one Kent type "G" mill; 36 in. and 40 in. cage mills; 3 ft. and 4½ ft. Hardinge mills; 18x12 in., 20x12 in., and 30x10 in. roll crushers; No. 0, No. 1 and No. 3 Sturtevant rotary crushers; one No. 2 Sturtevant ring roll crusher; 3 roll and No. 000 and No. 00 Raymond mills; one No. 5 Telumith breaker; one 36 in. Sturtevant emery mill; four Giant Griffin mills; one Junior Griffin mill; one 51x14 in. chaser mill.

SPECIALS—Five automatic package weighing machines; jigs; one keystone excavator; 6x8 ft., 6x5 ft., and 4x3 ft. Newaygo vibrating screens, Richardson automatic scales.

Air compressors and tanks.

W. P. HEINEKEN, Engineer

95 Liberty Street, New York Tel. Corti. 1841

FOR SALE

2—13-ton Standard-gauge Whitcomb Gasoline Locomotives.

1—Class "C" Ingersoll-Rand Air Compressor, 925-ft.

1—Class "H" Ingersoll-Rand Air Compressor, 342-ft.

1—Aerial Tramway System, 1100-ft. centers, with 12 buckets and carriers, 2650 ft. ¾ in. pulling cable, with 1¾ in. and 1¼ in. carrying cable, with sheaves, counterweight equipment, 65 H. P. motor and speed reduction gears complete.

1—Model G Marion Shovel, 2 yd. dipper, standard railroad trucks, excellent condition; price right.

THE CASPARIS STONE CO.

Columbus, Ohio

When writing advertisers please mention ROCK PRODUCTS



USED EQUIPMENT



FOR SALE

LOCOMOTIVES

30-ton Saddle Tank, 4' 8½" gage.
26-ton Saddle Tank, 36" gage.
18-ton 10 x 16 Vulcan, 36" gage.
11x16 American, 36" gage.

DUMP CARS

40—K. & J. 6-yd. S. G.
20—4-yd. Western, 36".
18—4-yd. Continental, 36".
25—4-yd. K. & J., 36".

CRANES—LOCO.

15-ton Browning, 4 W.
40-ton Industrial, 80' boom.
10-ton Industrial, 35' boom.
20-ton McMyler, 50' boom.

What do you need?

PECKHAM & CO.

Leader-News Bldg.
Cleveland, Ohio.

Climax Geared Locomotive

40 ton, standard gauge, 12x14, completely overhauled, immediate shipment, cash or terms, located here. Also, 16x24, standard gauge, 35 ton, American type locomotive.

Lock Box 205

Crown Point, Ind.

FOR SALE

One second hand No. 5 Good Roads Crusher, with opening 11"x26", in excellent condition; a real bargain to a quick buyer. Address

Box 1453

Care of Rock Products

FOR SALE

Wagon Loader, Jeffrey Type A-5 Gasoline Self Propelling. Practically new and in perfect condition.
2—Robins Belt Conveyors, Complete with idlers, drives and 20" belts. New.

JOSEPH L. HILLER

21 S. 12th St.

Philadelphia, Pa.

IMMEDIATE DELIVERY

No. 9 and No. 8 K GATES CRUSHERS
2—150 H.P. 125 lbs. HRT. boilers, butt strap.
4—No. 6 Gates (Mang. Flt.) nickel steel shafts.
1—No. 7½ and 1 No. 8 Gates regular drive.
No. 4 Telsmith plant, A. C. motor drive.
Air compressors (steam belt) 50 to 4,000 ft.
40 boilers 60-150 H.P. 100-150 lbs.
75 H.P. LOCO. BOILER, 125 lbs.
4 NEW No. 4 Gates, Mang. Flt. \$2,000 each.
10 coils Roebling ¾ in. traction cable (used.)
3-bag Koehring paver, practically new.
Type "O" ¾-yd. Thew steam shovel.
50, 25, 20, 15 and 125 Kw. engine and turbos.
1—42x16-in. TRAYLOR ROLL CRUSHER.
2—150 Kva. 240 V. 60 CY. 3 Ph. engine sets.
50 Kw. 125 V. Dir. Cur. eng. set. \$800.
Send us your inquiries—Pumps, Steam and Electric Equipment, etc.

ROSS POWER EQUIP. CO.
INDIANAPOLIS, IND.

NO. 7½ AUSTIN GYRATORY CRUSHER

Standard Drive

Complete with elevator and revolving screens. Condition excellent. Also
No. 5 Austin, standard drive, with 30-ft. elevator. Condition excellent.

Both plants thoroughly rebuilt, and can be shipped promptly. We also have many other bargains. Write us fully.

Reading Engineering Co., Inc.
1227 Tribune Bldg. New York, N. Y.

FOR SALE

No. 1 Sturtevant Ring Roll Pulverizer.
9"x18" Climax Jaw Crusher.
75 h.p. Erie City Steam Engine.
125 h.p. Atlas Steam Engine.
12"x12" Lidgerwood Standard Cableway Engine.
44" diam. by 20" long Rotary Dryer.
600 lineal feet 1½" Roebling wire rope.
100 h.p. 60 cycle, 550 volts, F&M Motor, never used.
100 K.W. 60 cycle, 550 volts, F&M Generator, never used. Address E. W. Cooper, Engineer.
2010 Locke Ave., Nashville, Tenn.

WANTED

15 standard gauge quarry cars, 2½ to 3 cu. yd. capacity. Give all particulars and furnish sketch with your reply.

INLAND CRUSHED STONE CO.
139 North Clark Street Chicago, Ill.

FOR SALE

2—14 in. diameter, 6 ft. stroke

AIR HOISTS

made by the Whiting Foundry & Equipment Co. Used very little and in first-class condition. Price \$110.00 each.

CLINTON BRIDGE WORKS
Clinton, Iowa

Private Equipment for Sale or Rent

Byers Auto Crane, ¾ yd. clam shell.
Thew revolving shovel ¾ yd.
8,000 ft. 24-in. gauge 20-lb. track.
Whitcomb gasoline locomotive 24-in. gauge, 3½ ton.
50 Koppel V-shape steel dump cars, 1¼ yd.
Derrick Car, standard gauge.
Sturtevant rolls, 20x14-in.
No. 5 Austin crusher, rear drive.
Keystone excavator, No. 3.
Jaw crusher, 9x14.
Bucyrus shovel, 65-ton, 2¼ yd., mounted on railroad trucks (bargain).
35-ton locomotive, 16x24.
40-ton Climax, 12x14, geared locomotive, std. gauge.
7,000 ft. 2-in. black pipe.
Holt caterpillar tractor, 45 H.P.
3 steel trailers, 5 yd.
¾ yd. Hayward orange peel bucket.
2 derricks (guy and stiff leg).
Porter locomotive 36-in. gauge, 6-wheel, 23-ton.
Ingersoll Sargent 1000-ft. compressor.
I own the above, will sell, or rent to responsible party.

Daniel B. Straley, Crown Point, Ind.

FOR SALE

100 H.P. Locomotive Fire Box Boiler, 125 lbs.
100 H.P. Vertical Boiler, 100 lbs.
1—No. 8 Good Roads Jaw Crusher on skids, with 40-ft. Jeffrey chain bucket elevator.
1—No. 9 Good Roads Jaw Crusher mounted on wheels, with 14-ft. bucket elevator.
1—36" Symons Disk Crusher.

The Carmichael Gravel Company
Rialto Building, St. Louis, Mo.

FOR SALE

FULLER MILL, 42" Standard, fan discharge, belt driven type. Practically new, immediate delivery. LOCOMOTIVE, 18 ton, 10x16 Porter 36" gauge saddle tank in good operative condition. Address

Box 1450

Care of Rock Products

HOIST ENGINE

One New Hoist 9"x12" double Cyls. double drum, with or without NEW A. S. M. E. boiler. Both cheap.

CRUSHERS

One No. 6 and one No. 7½ McCully Gyratory Crushers. Perfect condition.

A. J. O'NEILL CO.

Weightman Building

Philadelphia, Pa.

Idle Machinery Absorbs Profits

This department is the medium for the men who keep the wheels going. Sell your idle machinery to the man who'll keep it going.

For prompt and satisfactory results in buying or selling a plant securing help or a position, use the Classified Department of
ROCK PRODUCTS

USED EQUIPMENT

FOR SALE

One Allis-Chalmers No. 4 "K" Stone Crusher in good condition; also one 10x10 Blaisdale Air Compressor.

The Cedarville Lime Company
Cedarville, Ohio

FOR SALE

2—No. 18 Gates K Gyratory Crushers with elevators and screen; complete; first class; immediate delivery. Also twenty other sizes.

J. F. DONAHOO CO.
Birmingham, Ala.

New—RAILS—Relaying

All sections on hand for quick shipment. Reasonable prices quoted. Our stock is very complete.

M. K. FRANK
Frick Building Pittsburgh, Pa.

CLASSIFIED ADVERTISING

Rates for advertising in the Classified Department: \$2.50 per column inch per insertion. Minimum charge, \$2.50. Please send check with your order. These ads must be paid in advance of insertion.

Plants for Sale

FOR SALE

To responsible parties, an attractive Gravel and Sand proposition, located twenty-five miles west of St. Louis, Mo., on the Merrimac River. Ideal railroad facilities. Unlimited market in St. Louis and adjacent territory. Very little competition. Gravel now selling in St. Louis at \$2.20 per yard. Big outlet for production to contractors on roads on new \$60,000,000 road bond issue in Missouri.

GEORGE L. FRAZIER
GLENCOE, MO.

Situations Wanted

POSITION WANTED

as superintendent in construction and operation of sand and gravel plant. Have had 20 years' experience. Also broad experience in long distance pumping and constructing pumping plants. Hold a pilot license on the Mississippi River. First class references will be furnished. Age 40 years. Address

Box 1446 Care of Rock Products

Superintendent

With 20 years' experience quarry and general excavation work, thoroughly familiar with operation and up-keep of crushing plants, well hole drilling and blasting and steam shovel operation. References. Address

Box 1454 Care Rock Products

Miscellaneous

Old established eastern manufacturing company desires to increase their manufacturing activities and is looking for a patented machine or specialty to manufacture. Prefer something closely allied to the Cement, Rock Crushing or Fertilizer Industry. Give complete particulars with first communication. Address

Box 1455 Care of Rock Products

Have you a plant for sale? Do you wish to purchase a plant? Are you in need of a superintendent or manager? Are you looking for a position as plant superintendent or manager? Advertise your wants in these columns for quick results.

ANCHOR BRAND COLORS

For Mortar, Cement and Brick—
Brown, Black, Red and Buff
—Strongest and Most Durable

Manufactured by

C. K. Williams & Co.
Correspondence Solicited EASTON, PA., U. S. A.

The Fuller Engineering Co.

Designing, Constructing and Operating Engineers

Analytical Chemists

Cement and Hydrated Lime Plants a Specialty

Offices: Allentown National Bank Building
ALLENTOWN, PENNSYLVANIA

PRESTON K. YATES

Designer and Construction Engineer

Of Stone Crushing Plants, Conveying and Storage
Systems, Quarry Operations, Rotary Lime Kilns, etc.

120 Broadway New York

Robins Conveying Machinery

is handling limestone, clinker, cement in bulk
and in bags, gypsum, sand, gravel, crushed stone
and many similar materials. Write for a copy
of the Robins Handbook of Conveyor Practice
and learn more about the Robins System.

Robins Conveying Belt Company Park Row Bldg. New York City

Chicago, Ill., Old Colony Bldg.

Pittsburgh, Pa., Union Arcade Bldg.

San Francisco, Cal.

Birmingham, Ala.

The Griffen Co., Holbrook Bldg.

C. B. Davis Eng. Co., Brown Marx Bldg.

Salt Lake City, Newhouse Building

James N. Hatch, C. E., M. E.

Member A. S. C. E.

CONSULTING ENGINEER
500 Old Colony Bldg., Chicago

Designs and Constructs

Complete Sand and Gravel Screening and Washing Plants.

Stone Crushing and Storage Plants. Conveying Systems.
Contractors' Material Plants

Electric Generating Plants and Transmission Lines.
Estimates and Plans Furnished

We Design and Equip Complete Plants

for the manufacture of gypsum products, such as wall
plaster, moulding plaster, wall board products, gypsum
block products, also mixing plants.

We are prepared to furnish complete machinery-equip-
ment and design and furnish plans for the installation.
Consult our Engineering Department. Forty years' expe-
rience in designing of wall plaster machinery and plants.

The J. B. Ehrsam & Sons Mfg. Co.

Engineers, Machinists and Founders

Enterprise, Kansas

Robert W. Hunt Jno. J. Cone Jas. C. Hallsted D. W. McNaugher

ROBERT W. HUNT & CO.

Inspection—Tests—Consultation

Inspection New and Second Hand Machinery, Pumps, Crushers,
Steam Shovels, Cars, Locomotives, Rails and Quarry and
Contractors' Equipment

INSPECTION AND TESTS OF SAND, GRAVEL, CEMENT, STRUCTURAL
STEEL, CASTINGS AND CONSTRUCTION MATERIALS

Cement, Chemical and Physical Testing Laboratories

New York CHICAGO Pittsburgh
St. Louis Kansas City Cincinnati San Francisco

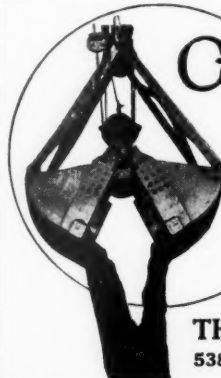
F. L. SMIDTH & CO.

50 CHURCH STREET

NEW YORK

Engineers

CEMENT MANUFACTURING PLANTS
CEMENT MAKING MACHINERY
PULVERIZED COAL INSTALLATIONS
GRANULATING AND PULVERIZING
MACHINES FOR ALL MATERIALS
FLINT PEBBLES—SILEX LINING
THE LENIX BELT DRIVE



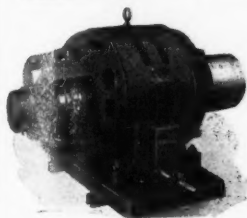
Owen Buckets

combine dollar-sav-
ing features of bucket
construction which
are illustrated in our
latest catalogue.

Write for it today.

THE OWEN BUCKET CO.
538 Rockefeller Bldg., Cleveland, Ohio

Electric Motors

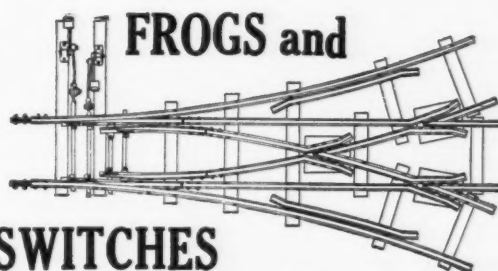


Large Stock of New
and Used

**Motors and
Generators**

Repairs for Any Make
or Type

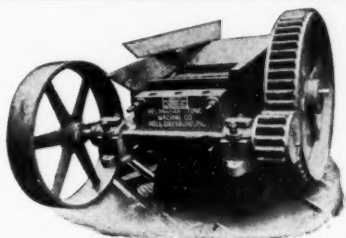
Sorgel Electric Co., Milwaukee, Wis.



SWITCHES

The Central Frog & Switch Co., Cincinnati, O.

Frogs, Switches, Crossings, Switch Stands, Rails, Angle Bars,
Fishplates, Throws, Rail Braces, Tie Plates, Portable Track,
Etc., Etc.



OUR SINGLE ROLL CRUSHER

is as simple as can be. Is easily fed, makes less fines than
either a Gyratory or Jaw. Capacity 5 to 500 tons per hour. For
crushing Limestone, Dolomite, Hard Rock, Phosphate, Cinders,
etc. Screens of all descriptions. Washers for dirty stone.

Ask for Information
McLANAHAN-STONE MACHINE CO., Hollidaysburg, Pa.

PERFORATED SCREENS

MADE TO SUIT YOUR REQUIREMENTS
Let Us Quote Prices
Service and Quality



NORTMANN-DUFFKE CO.
1200 27th Avenue Milwaukee, Wis.

SCREENS of All Kinds

Chicago Perforating Co.

2445 West 24th Place

Tel. Canal 1459

CHICAGO, ILL.



The Advance Engineering Company
Cleveland, Ohio

The "ADEN" Crane and Bucket

Special Interest to Sewer Contractors and Special Excavation Problems



E. 140 St. Sewer, Cleveland, O., — 34-Yd. Heavy Bucket being used

**Locomotive
Cranes**



**Special
Cranes**

Rotating Tower Cranes

Any Size or Capacity. Hand or Electrically Operated.
Stationary or Traveling.

Let Us Know Your Requirements

The American Crane & Engineering Co.
Toledo, Ohio



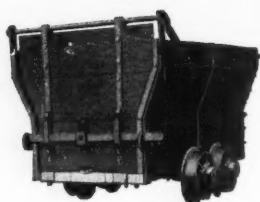
for elevators,
dredges, lumbering,
mining, oil-well drill-
ing, suspension
bridges, stump pull-
ing, cranes, derricks,
ships' rigging and
every other form of
wire rope use

Illustrated
Catalogue
—Free

American Steel & Wire Co.
Chicago New York

When writing advertisers please mention ROCK PRODUCTS

WATT CAR

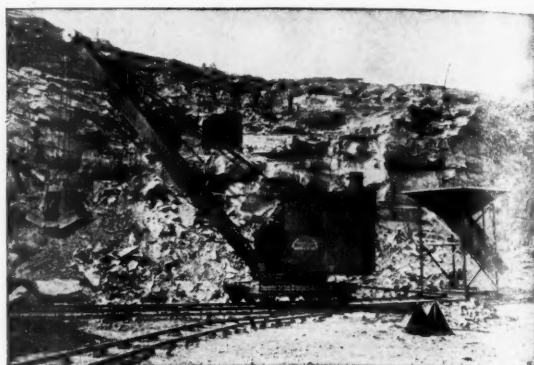


Our factory the largest in the world devoted
exclusively to car building

Write today for catalog

The Watt Mining Car Wheel Co.
Barnesville, Ohio

Denver: Lindrooth, Shubart & Co., Boston Bldg.
San Francisco: N. D. Phelps, Sheldon Bldg.
Philadelphia: Edelin & Co., 235 Commercial Trust Bldg.



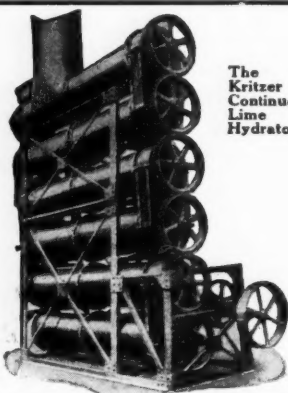
O. S. DEPENDABLE Locomotive Cranes

reduce expenses of handling materials, increases
profits and output wherever installed. Catalog
No. 16 contains valuable information and is
mailed upon application.

□□

ORTON & STEINBRENNER CO.

Chicago, Ill.
Factory—Huntington, Ind.



The
Kritzer
Continuous
Lime
Hydrator

Hydrating Lime

97% of Hydrated Lime is made either by the Old or by the New Kritzer Process.
We Guarantee to manufacture the Best Product at the Lowest Possible Cost.
Our engineers have worked out every practical improvement in use today in
hydrating lime.

*It is our business to solve your problems.
It is our business to investigate thoroughly the conditions that prevail at every
plant, to work out all the details and to build a plant that will prove a
success from the start.*

We assume the Responsibility. Now is the time for you to act. Take the matter up with
us NOW and we will outline your whole proposition for you.

THE KRITZER COMPANY

503 South Jefferson Street

CHICAGO, ILL.

Conveyor, Loading, Steam Shovel, Dredge, Crane, Quarry and Hoisting Chain

UNITED STATES CHAIN & FORGING COMPANY
Union Arcade "As Good as the Name" Pittsburgh, Pa.



When writing advertisers please mention **ROCK PRODUCTS**



2 1/2 TON 3 SPEED GASOLINE LOCOMOTIVE.
GEAR AND FRICTION DRIVEN
GASOLINE LOCOMOTIVES—2 1/2
TO 25 TONS ON DRIVE WHEEL

WHITCOMB LOCOMOTIVES

IT WILL PAY YOU TO GET OUR
PROPOSITION BEFORE YOU BUY

GEO. D. WHITCOMB CO.

MAIN OFFICE AND WORKS

**ROCHELLE, ILLINOIS
U. S. A.**



5 TON FRICTION DRIVE GASOLINE LOCOMOTIVE.
STORAGE BATTERY LOCOMO-
TIVES—1 TO 8 TONS ON
DRIVE WHEELS



COMPLETE INSTALLATIONS For Stone Quarries or Lime Plants

We are prepared to build and superintend the installation of all equipment necessary to start operations.

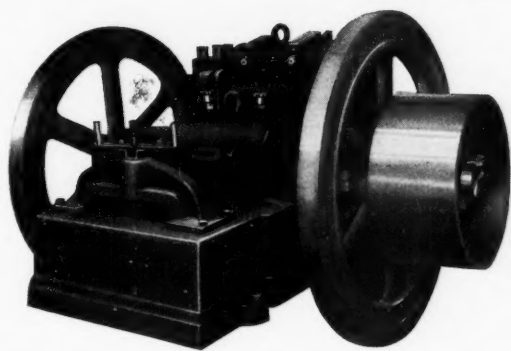
Reliance Products are equal to the best and we know that our engineers can save you money by their recommendations. Prompt deliveries.

Let Us Quote You Prices

Universal Road Machinery Co.

Kingston, N. Y.

Reliance Quarry and Road Building Equipment



WEBB CITY and CARTERVILLE CRUSHERS

There is a widespread recognition of the complete trustworthiness of the Webb City Crushers. Service under rigid conditions have proven their lasting qualities and confirmed their supremacy in design and construction.

**WEBB CITY & CARTERVILLE
FOUNDRY & MACHINE WORKS**
WEBB CITY, MO.



STANDARD Sheave Blocks

Special features combine to make these blocks the unquestionable choice of superintendents of pits and quarries. They are exceptionally strong, compact, and easily handled, on either hoist or Scraper Systems, about the scene of operations. Large clearance at the top of the pulley allows all splices or kinks in the rope to pass thru freely.

Supplied in three sizes; with 7", 8" and 9" (diameter of Sheave Wheels). Phosphorous Bronze Bushings are provided with proper means of lubricating.

Write us for quotations and circulars

Mining Machine Company
Mountville, Pa.



Many Notable Improvements Characterize



THE "American" Gearless Blast- Hole Drill

While the normal speed of drilling is 50 strokes a minute, this machine will jump the tools smoothly at 60 strokes, handling with ease a 4-in. diameter by 20-ft. length drill stem equipped with bit and socket weighing from 1100 to 1200 lbs. and drilling 5 3/4-in. or 6-in. holes.

The spudding beam is attached to the crank in such manner that it gives a quick, hard stroke of drill at a speed of 50 or 60 r. p. m., with a minimum of whipping of cable.

No clutches on the machine; the crank is keyed fast to the crank shaft, and the tools are always the full length of the stroke off the bottom when stopping, permitting them to start on the down stroke with engine or motor at full speed without backing up.

Description on Request

The American Well Works Aurora, Illinois

BATES WIRE TIES

*for tying reinforcement
in concrete construction*



Ties all kinds of reinforcement effectively—mesh, bars, metal lath, expanded metal. Also used in the manufacture of concrete pressure pipe and sewer pipe.

A handy tool which means efficiency and speed to the workman—a money saving device to the contractor.

Write for illustrated price list.

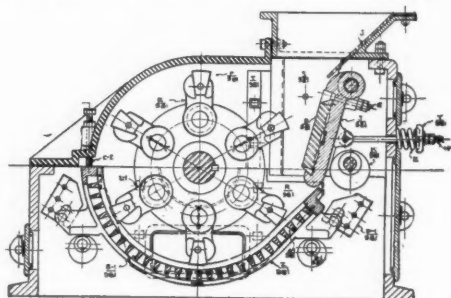
We also make the Bates Packer for packing cement, ground limestone, etc.

BATES VALVE BAG COMPANY

7310 South Chicago Avenue
CHICAGO, ILL.

W. I. 110 Great Portland St., London, Eng.

THE KENNEDY Swing-Hammer Pulverizer



A Mechanically Perfect Device

The Kennedy Swing-Hammer Pulverizer embodies mechanical improvements heretofore considered unattainable. Reversible, renewable hammer tips and breaker plates of alloy steel. Impact pulverizing—no grinding movement. Adjustable steel grid—so controlled as to permit adjustment while machine is running. Automatic lubrication. Ball and socket bearings—in short, every possible improvement tending toward efficiency, durability and low maintenance expense.

Send for full description

Kennedy Van Saun Mfg. & Eng. Corp.
120 Broadway New York



CALDWELL Belt Conveyors

Simple—Economical

will solve your handling problem. Simple in design, economical of power, they give the utmost satisfaction. Our forty years' experience has made us thoroughly familiar with the many details of construction necessary to success.

A rough sketch showing the conditions to be met at your plant will bring our recommendations. We should also know the capacity desired and the power available.

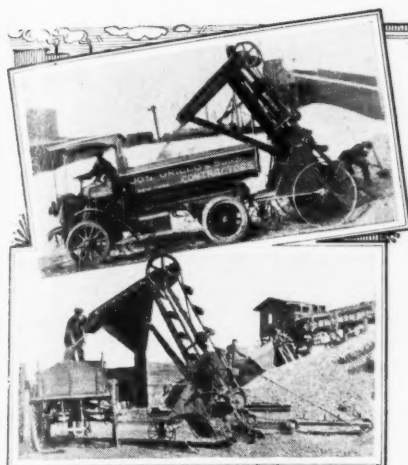
Get Catalog No. 38

H. W. Caldwell & Son Co.

Elevating, Conveying and Power Transmitting Machinery

Chicago 17th Street and
Western Avenue

50 Church Street
New York, N. Y.



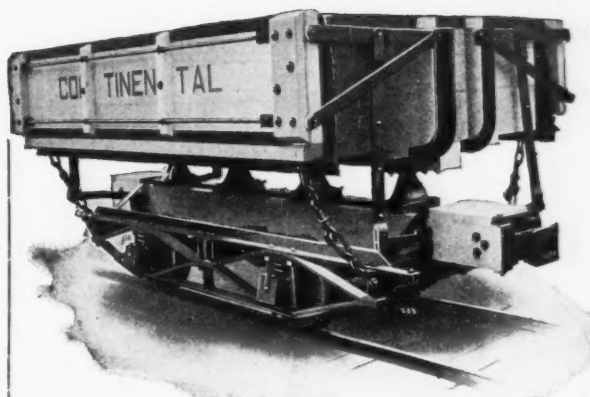
No organization that stores loose material on the ground can afford to be without a Gifford-Woods

Wagon Loader. They are the essential to complete yard efficiency and are made to meet every condition.

Let us know your problem and we will submit a money saving plan at once.

Gifford-Wood Co.

NEW YORK CHICAGO MAIN OFFICE AND WORKS HUDSON, N. Y. BOSTON BUFFALO



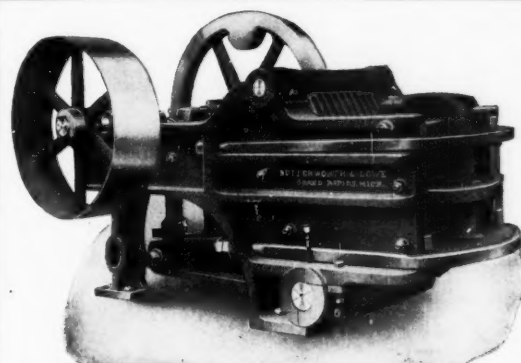
Built stronger to wear longer

Service—

Continental Dump Cars are reinforced against excessive wear and loading shocks, and intermittent and varying speeds, to render efficient service at low maintenance cost.

They Are Splendid Buys

Continental Car Co. of America
Incorporated
Louisville, Kentucky



Nippers—17x19", 18x26", 20x30", 24x36" and 26x42"

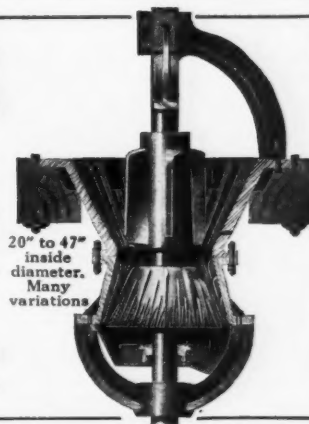
JAW & ROTARY CRUSHERS

For All Rocks and Ores
Softer Than Granite

GYPSUM MACHINERY—We design modern Plaster Mills and make all necessary Machinery, including Kettles, Nippers, Crackers, Buhrs, Screens, Elevators, Shafting, etc.

Special Crusher-Grinders for Lime

Butterworth & Lowe
17 Huron St. Grand Rapids, Mich.



20" to 47" inside diameter. Many variations

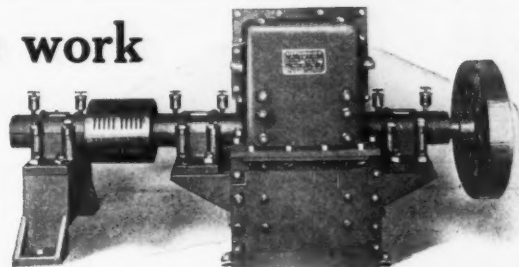
By the very nature of the work

it is called upon to perform a pulverizer must be much stronger than the material it handles.

Only STEEL will stand the stress
"K-B" is built ALL-Steel

Catalog with full particulars on request

K-B PULVERIZER COMPANY, Inc., 92 Lafayette St. NEW YORK



K-B
PULVERIZER

When writing advertisers please mention ROCK PRODUCTS

HETTRICK Canvas Belting

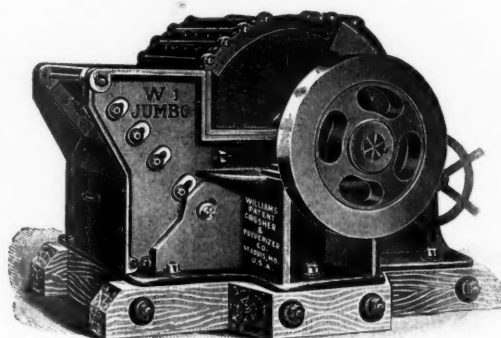


The steadily increasing sales of the Hettrick Belting is unquestionably due to the fact that it is fundamentally a better belting.

Every piece of this belting that leaves our plant carries a guarantee of service, quality and satisfaction. It is a high grade, full weight

belting, with quality built right into every foot of it.

The Hettrick Mfg. Co.
Toledo, Ohio



Williams Crushers

Williams Jumbo Crushers are used in quarries as secondary crushers, taking 10-inch and under limestone, as it comes from the primary crushers, and reducing the material to 1½-inch, 1¼-inch or 1-inch and under in one operation. These machines are built in capacities ranging from 30 tons to 300 tons per hour. Many are now in operation. Complete details concerning these crushers are found in bulletin No. 4-B.

WILLIAMS PATENT CRUSHER AND PULVERIZER COMPANY
HINGED HAMMER ESTABLISHED 1871
PLANT & OFFICES: 270 N. Broadway, St. Louis, Mo. GENERAL SALES OFFICES: 37 W. VAN BUREN STREET, Chicago, Ill. WESTERN OFFICE: 87 SECOND ST., SAN FRANCISCO, CALIF.

LOCOMOTIVE CRANES CLAM SHELL BUCKETS - SHIPBUILDING CRANES CAR DUMPERS PILE DRIVERS THE MCMYLER INTERSTATE CO. CLEVELAND, OHIO



A CRANE WITH A RECORD FOR SPEED

A McMyler Interstate Type "B" Crane, equipped with a McMyler Interstate Clam-Shell Bucket, made a record of 13 trips in 3 minutes, swinging at 90° each trip. The speed is important, but the fact that the crane will stand up under continuous service such as this is more important. The first cost of a crane is of little importance if a large percentage of return is insured. Greater speed, consequent greater capacity, together with low maintenance cost, make the Type "B" one of the best "buys" on the market.

The McMyler Interstate Co., Cleveland, O.

BRANCH OFFICES:

New York...1788 Hudson Terminal Bldg. Seattle...Hoge Bldg.
San Francisco...Merchants Exchange Bldg. Denver...18th and Wazee Streets
Chicago...612 Edison Bldg.

The Clyde Lime Hydrator Performance Counts

The Clyde was first in the field, and through dependable and economical performance is still first choice of lime operators.

The Clyde Hydrator produces big capacities of lime at only three-fifths the cost of any other hydrator on the market.

The Clyde not only produces over 90% of the hydrate of America, but makes the best quality of finishing lime from either high calcium or magnesium.

Simple, easiest to operate and most economical in cost of installing, maintaining, and operating.

Send for Catalog

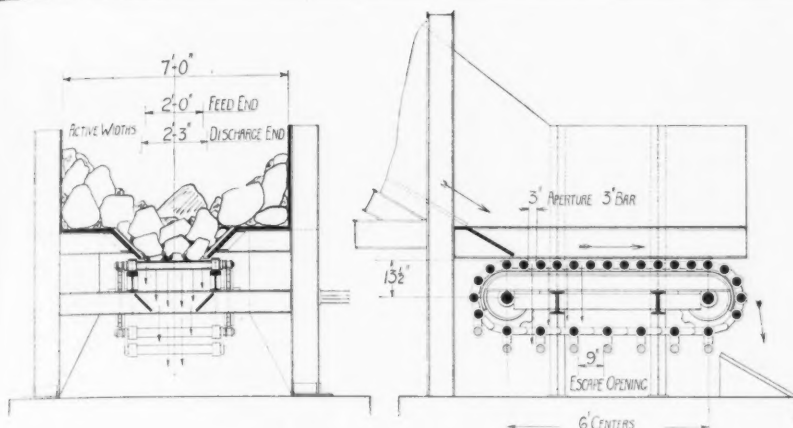


H. MISCAMPBELL
Patentee and Sole Manufacturer

DULUTH

MINNESOTA

When writing advertisers please mention ROCK PRODUCTS



ROSS

**Automatic Drop-Bar
Grizzly-Feeder**

Travelling Apron Type
Patented

is Fool-Proof
needs less Horse Power
has less Wear

The Ross Automatic Drop-Bar Grizzly-Feeder will not BLOCK or CHOKE. It will feed and screen the largest run of mine material—at an even rate for twenty-four hours a day without attendance.

Made in a variety of lengths with apertures from 12-in. down to 1/2-in.

The aperture of the returning apron is increased so enormously that the fines have free passage downward. The bars are made of solid mild steel or manganese steel to suit requirements.

Submit your problems to

ROSS ENGINEERING CO., Department T.
Old Colony Building, Chicago, Ill.
In Canada: 263 St. James Street, Montreal

“Perfect” Power Concrete Block Machine

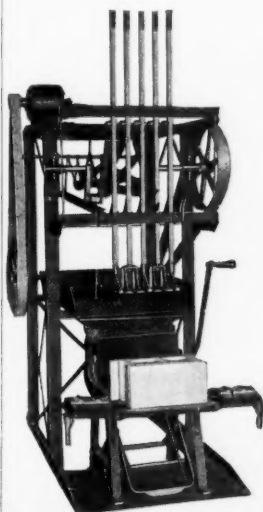
Also Hand and
Power Brick
Machines
Hand Block
Machines
Well, Cistern
and Silo Molds

C. S. WERT, Inventor and Patentee
GEARLESS—NOISELESS

This Power Block Machine, equipped with a one-horse power motor or 2 1/4 H.P. gas engine, and three men will manufacture 1,000 blocks in ten hours.

Earn \$100 daily with this machine. The opportunity to get in on the ground floor of an industry that is growing with tremendous speed is here. Get the “Perfect” Line of Concrete Machines and start now.

Manufactured by
The Wert Mfg. Co.
547 Railway
Exchange Bldg.
Chicago



Latest
Model,
Gearless
and Noiseless



Universal Crushers

The biggest value for your money. Universal crushers and pulverizers reduce stone to desired size or fineness in a jiffy!

Fifteen years of designing and building experience have made possible the exceptional ability of Universals.

Universal Crusher Co.
225 Third Street
Cedar Rapids, Iowa, U.S.A.

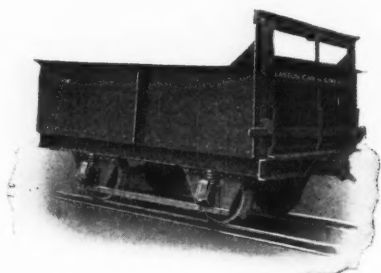


Ask
for
Folder
1918

When writing advertisers please mention ROCK PRODUCTS

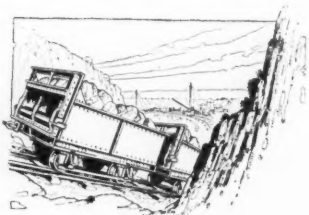
EASTON

INDUSTRIAL RAILWAY CARS



Quarry Car With Automatic End Door

EASTON CARS are available in every size and type suited to rock product service. "EASTON" on a car is the unfailing assurance for satisfactory operation, long life, and low maintenance. Quality is the prime consideration in the building of every Easton Car.



Skip, quarry, rocker dump, gable bottom, and scoop cars—any requirement, standard or special, can be met by the Easton Line.

Easton Engineers understand rock product problems. Use their services, which are free. And write for the Easton Bulletin, too.

EASTON CAR & CONST'N CO.

44 Dey Street, New York
Works: Easton, Pa.

Detroit

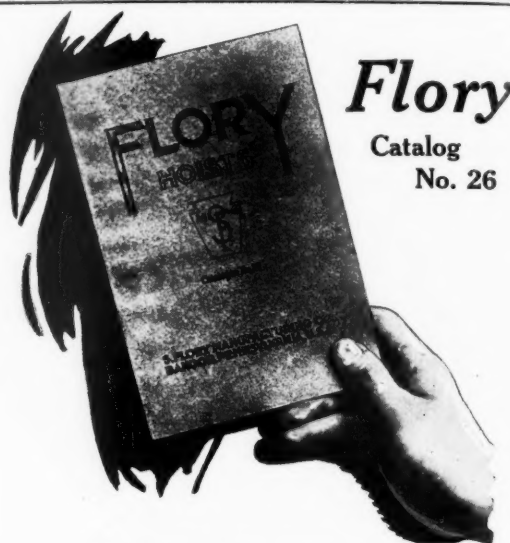
Pittsburgh

Boston

Philadelphia

Chicago

2100-E



Flory

Catalog
No. 26

Do you have your copy?
Describes a complete line of

Hoists

Cableways

Mining Hoists

Marine Auxiliaries

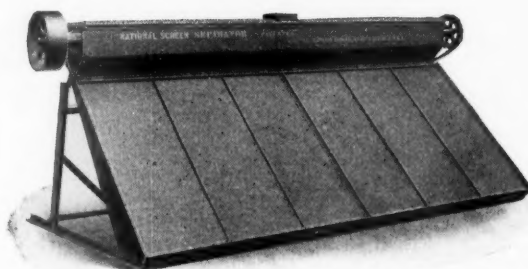
S. FLORY MFG. CO.

95 Liberty St.
New York

BANGOR, PENNA.

NATIONAL

Screen Separator



The Leading Screen in

Efficiency

Durability

Simplicity

Capacity

Write for Descriptive Literature to

NATIONAL ENGINEERING COMPANY

1549 West Washington Boulevard, Chicago

When writing advertisers please mention ROCK PRODUCTS

Go After More of This Business— THERE'S GOOD MONEY IN IT!

Start now to meet the increased agricultural demand for ground limestone. The profits are large and the market is far bigger than the supply. Ground limestone answers the same purpose as BURNED lime, yet sells at less than half, leaving a most satisfactory profit. American Ring Pulverizers are earning big returns in this work. They're brutes for work—with ruggedness and POWER, "plus." May we send you full particulars about this business? Just write for our free circular "How to Make Money Grinding Limestone."



Send for
Circular

American Pulverizer Co. 18th and Austin Sts.
ST. LOUIS, MO.

SCHAFFER Continuous Lime Hydrators

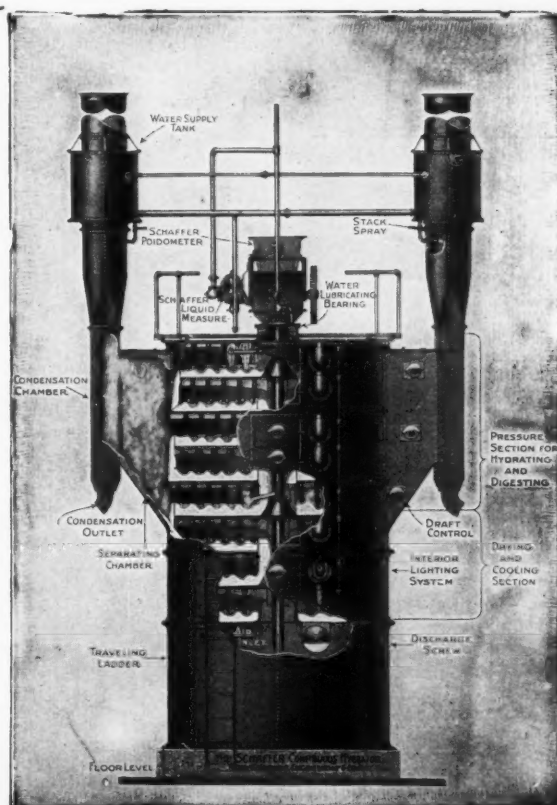
AUTOMATIC operation delivers lime by weight, not volume, to the Schaffer Hydrator. Automatically, water, too, is added in correct proportion—insuring a continuous flow of a superior product.

The flexibility of control enables the use of either high calcium or dolomite lime, while at the same time the automatic operation of Schaffer Hydrators solves the labor problem, as they require but little attention.

Our literature on the Schaffer Hydrator covers all the questions you now have in mind. Write for it at once!

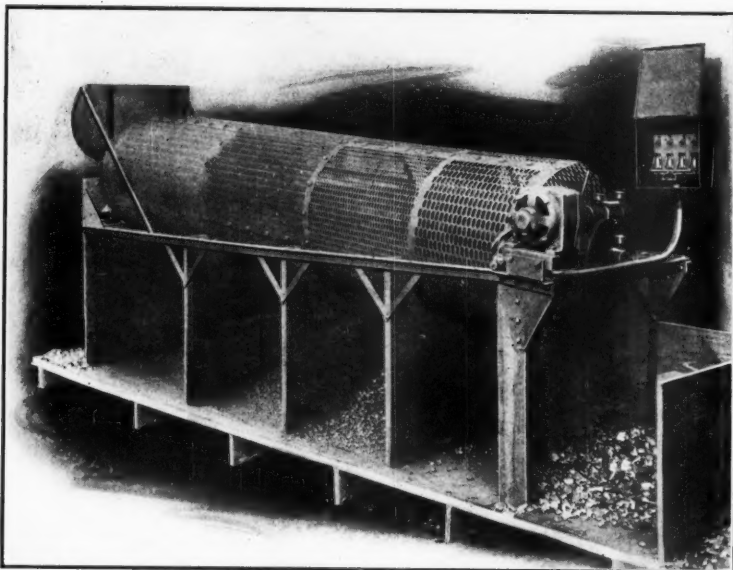
**Schaffer Engineering
& Equipment Co.**

Peoples Bank Bldg., PITTSBURGH, PA.



When writing advertisers please mention ROCK PRODUCTS

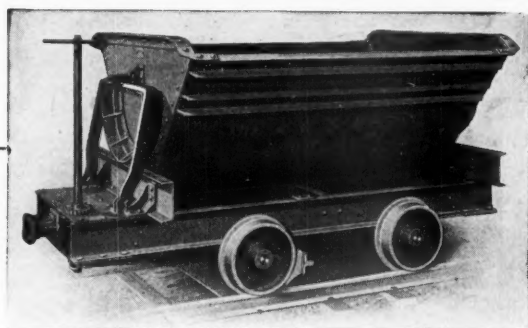
PERFORATED STEEL SCREENS



Sixteen years in the manufacture of Perforated Metals have not only resulted in developing our plant and securing adequate technical experience. We have also learned in this time what kind of service is necessary to secure and hold customers year after year, and we give that kind of service.

Write for Catalogue, or, better yet, send trial order.

Cross Engineering Co.
Office and Works
Carbondale, Pa.



More Than Reinforced

Reinforcing a dump car makes it stronger, of course. But there is a best way to reinforce. Atlas cars are reinforced the best way. Why? Simply because we have built dump cars so long and for so many people that we know just where the reinforcing should go and just how it should be done.

Not much wonder, then, that Atlas dump cars stand the "gaff" better than the average.

The Atlas Car & Manufacturing Company

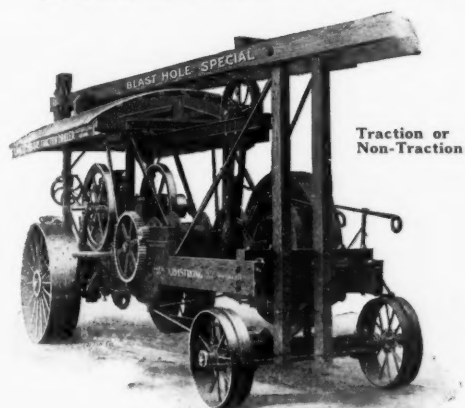
ENGINEERS

CLEVELAND, OHIO, U. S. A.

MANUFACTURERS

When writing advertisers please mention ROCK PRODUCTS

"Shoot the Whole Face With One Blast"



INSURE MAXIMUM PRODUCTION AND EFFICIENCY
BY USING

Armstrong
BLAST HOLE DRILLS
BUILT FOR SERVICE SINCE 1867

BUILT ESPECIALLY FOR HARD ROCK DRILLING

HOLD **WORLD'S RECORD** IN
BIG BLAST HOLE DRILLING

387 Feet 6-Inch Hole Drilled in 10 Hours in Rock

Positively the Fastest, Easiest to Handle, Cheapest to Operate, Most
Efficient and Dependable Blast Hole Drill Ever Designed

Kerosene, Gasoline or Electric Power

READ THIS BROAD GUARANTEE—IT PROVES ARMSTRONG SUPERIORITY

WE GUARANTEE THE ARMSTRONG No. 25 SPECIAL BLAST HOLE CABLE DRILL TO DRILL
MORE HOLE AT LESS COST IN A GIVEN TIME THAN ANY BIG BLAST HOLE DRILL ON THE
MARKET, AND WE WILL WRITE THIS IN EVERY SALES CONTRACT WE MAKE.

WRITE TODAY FOR CATALOG B-1, GIVING FULL PARTICULARS

ARMSTRONG MFG. CO., Dept. A, Waterloo, Iowa, U. S. A.

BRANCH OFFICES:

Ft. Worth, Texas, 265 West 15th Street
Scottsville, Kentucky
Baxter Springs, Kansas
New York, 30 Church St. (Export Office)

SALES AGENTS:

H. N. Steinbarger Co., 1539 16th Street, Denver
Collins Ferguson Company, Seattle-Portland
The Kaufman Co., 327 West 2nd Street, Los Angeles
Lund and Company, Box 503, Salt Lake City

MANUFACTURERS OF HIGH GRADE TOOLS AND SUPPLIES. SEND US YOUR ORDERS. PROMPT SERVICE—LOW PRICES

"HERCULES SOLID WELD" Steam Shovel Chains



We claim the "Hercules Solid Weld" to be the best chain
made for Steam Shovel use, and in this we are upheld in
the opinion of users throughout the world.

Manufactured only by:

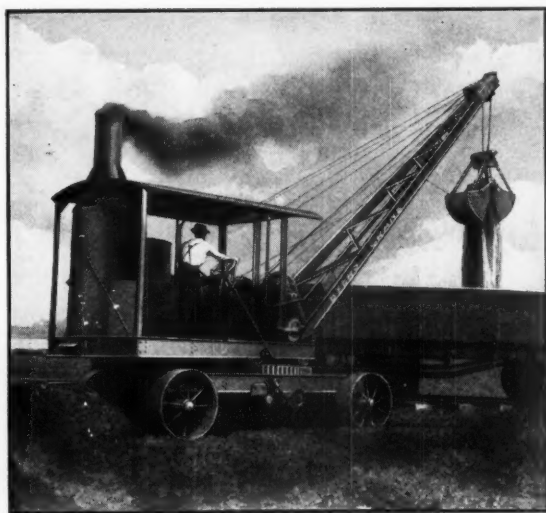
THE COLUMBUS McKINNON CHAIN CO.

COLUMBUS, OHIO

Canadian Factory:

THE McKINNON COLUMBUS CHAIN, LTD., ST. CATHARINES, ONT.

When writing advertisers please mention ROCK PRODUCTS



When equipped for rail service this machine will handle the work required of small locomotive cranes

A New Byers Crane— Full Revolving Type

THE John F. Byers Machine Company has brought out a full revolving crane. Its construction and design measure up to Byers' standards, established for 40 years. Purchasers may expect the same dependable service from this new machine that its partner—the half-circle swing "Auto-Crane"—is giving to more than 700 satisfied users.

Owners will find the new crane low in purchase and operating cost; sturdy and rugged, yet reasonably light in weight.

Full information gladly furnished. Write or wire us direct or see the nearest Byers representative.

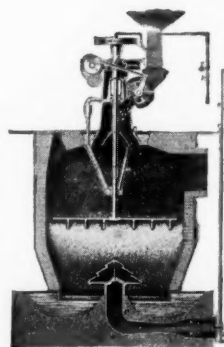
THE JOHN F. BYERS MACHINE CO., 310 Sycamore St., Ravenna, Ohio

Sales Representatives in 25 Leading Cities

PUTTING Chapman Floating Agitators with Automatic Feeds into your old Producers means getting the most out of your gas house. Some plants formerly using old hand poked producers report that Chapman equipment is saving them 70% Labor and 20% Fuel.

New Installations of course demand the most efficient and economical Gas Equipment—Chapman Stationary Producers with Floating Agitator and Automatic Coal Feed. Let one of our engineers call upon you, or let us send you full data.

The
CHAPMAN ENGINEERING CO.
C&G *Division of The*
COOPER
CO.
MT. VERNON, OHIO
11 Broadway, N. Y. Oliver Bldg., Pittsburgh



When writing advertisers please mention ROCK PRODUCTS

A General Manager of a large operation said recently that his profits for the entire plant were made by keeping down to the lowest possible point his stripping and mining costs.

We have helped others to do this. What we have done for others, we can do for you.

Are your costs what they should be?

GEO. B. MASSEY COMPANY

CONSULTING ENGINEERS

Specialists in Stripping and Mining

932 Peoples Gas Bldg

Chicago, Ill.

Here is the Solution to Your Fine Grinding Problem

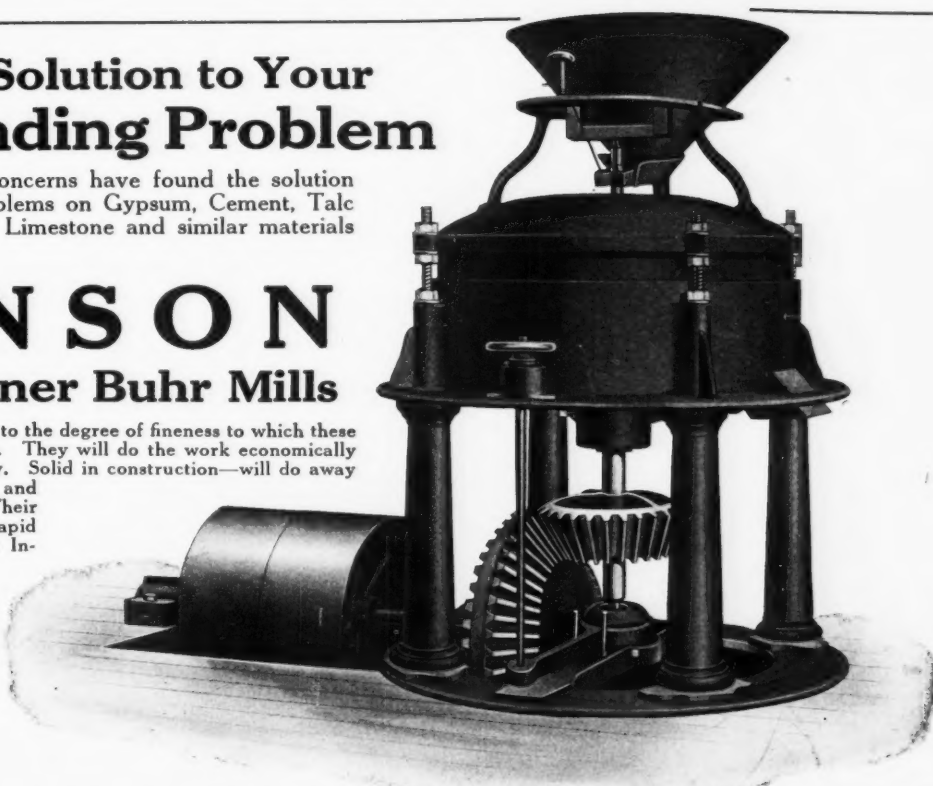
Many of the leading concerns have found the solution to their fine grinding problems on Gypsum, Cement, Talc and Soapstone, Graphite, Limestone and similar materials by installing

MUNSON Under Runner Buhr Mills

There is practically no limit to the degree of fineness to which these mills will grind these products. They will do the work economically and satisfactorily in every way. Solid in construction—will do away with delays and shut-down and keep out of the repair shop. Their Automatic Adjustment, Rapid Grinding and Perfect Balance insure good results and fine and uniform grinding.

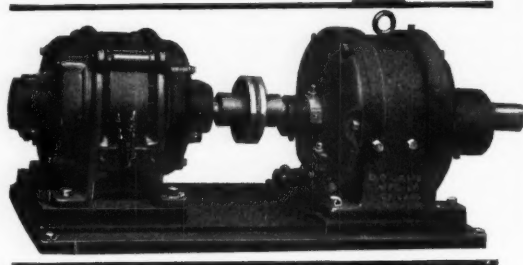
Why not investigate? Send for our new catalog, number 71.

**Munson Mill
Machinery Co., Inc.**
Utica, New York



When writing advertisers please mention ROCK PRODUCTS

James Speed-Reducing Transmissions



**Provide
Operating
Economy**

save space and save power. They are compact and easy to install. They are dust-proof and fool-proof. In cement, stone, and lime plants, where space is at a premium, and where dust conditions are unusually severe, James equipment for reducing motor speed appeals to the plant engineer. The power is delivered more economically and with less strain on the motor.

Any reduction of speed from the ratio of 4:1 to 1600:1 can be furnished.

Our engineering service is ready to assist you in definitely solving your problems connected with the economical delivery of power by direct connected motors.

Send for our latest
bulletin, No. 7

D. O. James Mfg. Co.
1120 W. Monroe St., Chicago, Ill.

Arrow Power Drag Scraper

If you are considering the purchase of a power drag scraper, investigate the performance of the "Arrow."

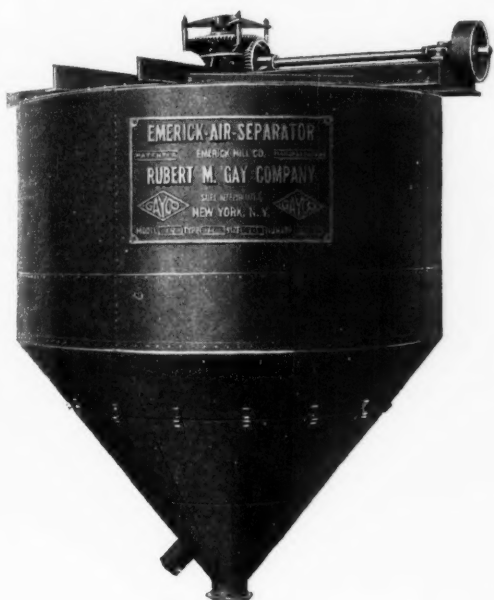
Ask the man who uses one. He knows, and invariably he is enthusiastic in his praise. During the past year we have made a large number of installations, and will be glad to put you in touch with our customer nearest your town, and, if possible, we advise you to see the scraper in operation. The economy both in installation and operating expense will make the decision for you.

"The man on the job is our best salesman"

L. P. GREEN, 907 Lumber Exchange Building, Chicago, Ill.



When writing advertisers please mention ROCK PRODUCTS



Something NEW in Air Separation

The Centrifugal Separating Chamber of the new



Model
Twenty-one



Emerick Air Separator

A Revolution in Air Separator practice and a Revelation to users of other devices. The solution of the fine separating problem. Increases the capacity and fineness of product of all types of grinding mills.

For Cement, Limestone, Hydrate, Coal, Talc, Gypsum and other ground materials. Produces Agricultural Limestone from Screenings at very small expense.

WRITE FOR PARTICULARS

RUBERT M. GAY COMPANY SOLE LICENSEE 114 Liberty Street, New York City

RAILS! RAILS!

New and Relayers

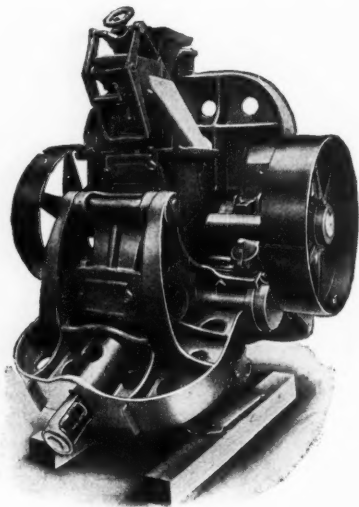
HYMAN - MICHAELS COMPANY

Peoples Gas Bldg., Chicago

New York, N. Y.
1324 Woolworth
Bldg.

BRANCH OFFICES:
Pittsburgh, Pa.
1313 1st National
Bank Bldg.

St. Louis, Mo.
2115 Railway Ex-
change Bldg.



MAXECON MILL

Preliminary Grinder for Tube Mills

LIMESTONE 20 to 40 Mesh
CEMENT CLINKER 20 to 60 Mesh

MAXECON MILL PERFECTION SEPARATOR

The UNIT that has LARGER
OUTPUT with LESS POWER
WEAR and ATTENTION than
any other.

It will be to the interest of those who operate CEMENT
PLANTS to know what the Maxecon Unit will do.

Drop us a line

We will be glad to tell you about it

Kent Mill Company

10 Rapelyea Street

BROOKLYN, N. Y.



Keeping Engines On the Job

The efficiency of your industrial engine depends on the aggregate work it does. So we leave nothing undone to keep your "Shay" engines working.

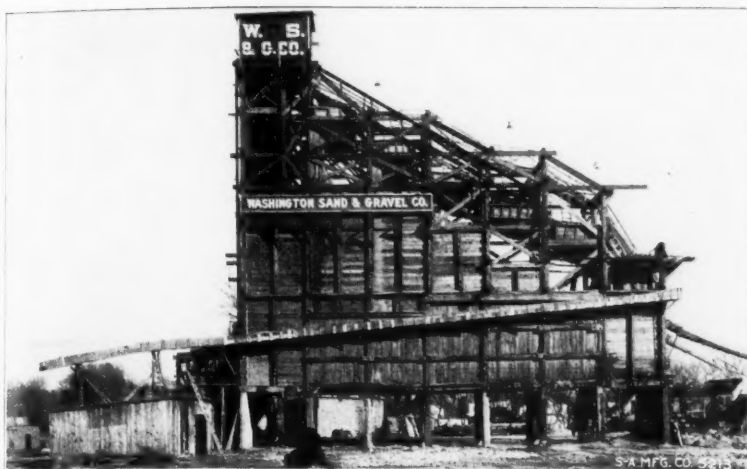
We design them and we build them as carefully as fine machines must be built if they are to last

—only the best materials are used in the making. This policy keeps "Shays" always working — moving rock and keeping your quarry running.

The proof is contained in the continually increasing number of "Shays" in the quarry field.

LIMA LOCOMOTIVE WORKS, Lima, Ohio, 30 Church Street, New York

When writing advertisers please mention ROCK PRODUCTS



Sand and Gravel Washing and Screening Plant

Illustration showing the plant of the Washington Sand and Gravel Co., equipped with S-A machinery.

The aggregate is pumped from the bed of a stream into a large concrete sump tank and reclaimed with an S-A digging elevator. A continuous bucket-elevator delivers the material to the screens.



STANDARDIZE—ECONOMIZE

When placing your contract for belt conveyor equipment, why not have standard specifications for the conveyor parts? In a word—why not standardize on the carriers you use?

You can standardize on your equipment by using the right carrier and nothing else. The conveyor carrier you use must be a standard line of dependable uniformity that you can obtain in a wide range of sizes to meet your requirements.

S-A Unit Carriers possess those factors of design and construction that warrant standardization where reliable service is required.

SPECIFY UNIT CARRIERS

STEPHENS-ADAMSON MFG. CO., AURORA, ILLINOIS

New York City
Chicago, Ill.

St. Louis, Mo.
Boston, Mass.

Pittsburgh, Pa.
Detroit, Mich.

Los Angeles, Calif.
Cincinnati, Ohio

Salt Lake City, Utah
Huntington, W. Va.

Toronto, Canada
London, England

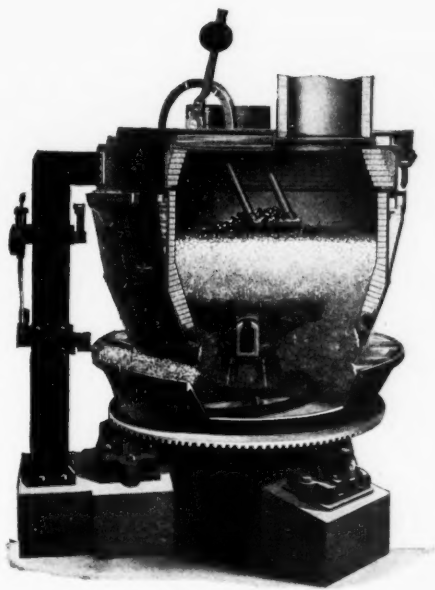
Paris, France
Johannesburg, S. Africa

Sydney, Australia
Kristiania, Norway

Calcutta, Bombay, Singapore, Rangoon—India

Osaka, Kobe, Yokohama, Tokyo—Japan

The Machine of Absolute Satisfaction



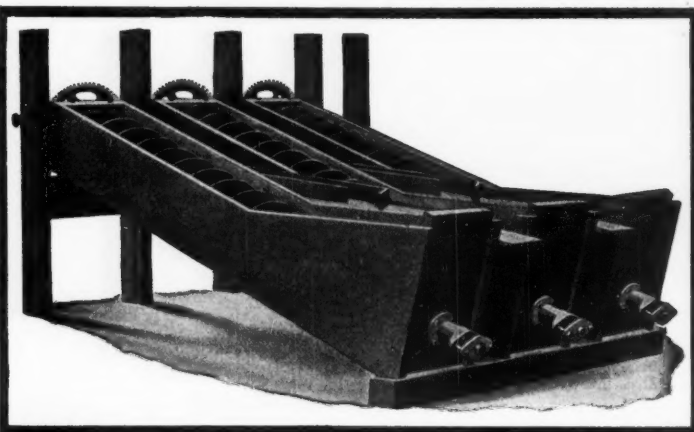
Selected by every large purchaser in the steel industry since the armistice. Three recent installations at leading Eastern Lime Plants.

POKERLESS PRODUCER-GAS MACHINE

Users everywhere testify with one voice to the superior satisfaction and low maintenance expense of this splendid machine. Difference in first cost comes back annually; every detail built for endurance.

Morgan Construction Company
Worcester, Mass.

LEWISTOWN EQUIPMENT



**Will Solve
Your Problem**

The coming attempt to relieve the housing situation throughout the country will make heavy demands on glass manufacturers, consequently our glass sand producers. The Lewistown Equipment, which includes Crushing, Grinding, Screening, Washing, Drying and Conveying Machinery will produce more, and a better quality of glass sand, at a bigger profit than any other equipment on the market.

We are in a position to help you meet problems for pit and quarry service, with reasonably priced, sturdily constructed machines that are built to give lasting service.

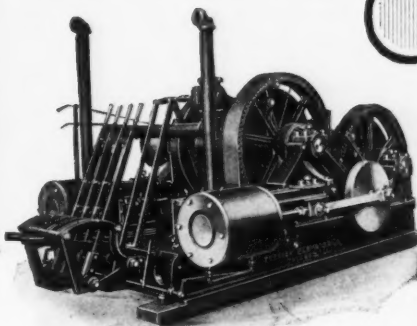
Will you drop us a line, stating what equipment you desire information on?

Lewistown Foundry & Machine Co., Lewistown, Pa.

When writing advertisers please mention ROCK PRODUCTS

THOMAS HOISTS

Steam & Electric
Single & Two Speed
Types



Thomas Hoists are designed and built to meet every requirement of the sand, gravel and stone producer. They include Steam and Electric, Single and Two Speed Hoists for Slack-line Cableways, Drag Scrapers, Derricks.

By sheer merit, and wonderful durability, they are almost habitually referred to as the best of their class in the country.



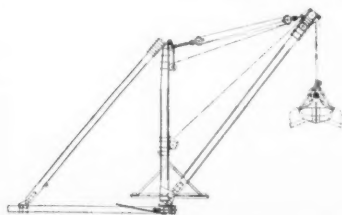
Thomas Elevator Company
21 South Hoyne Avenue CHICAGO



TERRY FULL CIRCLE CRANES

IN operation at the Bessemer Limestone and Cement Company's plant reclaiming clinker, boom 100 foot, bucket 3 cubic yard capacity. This crane gives them a 150,000 barrel storage at *one handling* at a minimum expense.

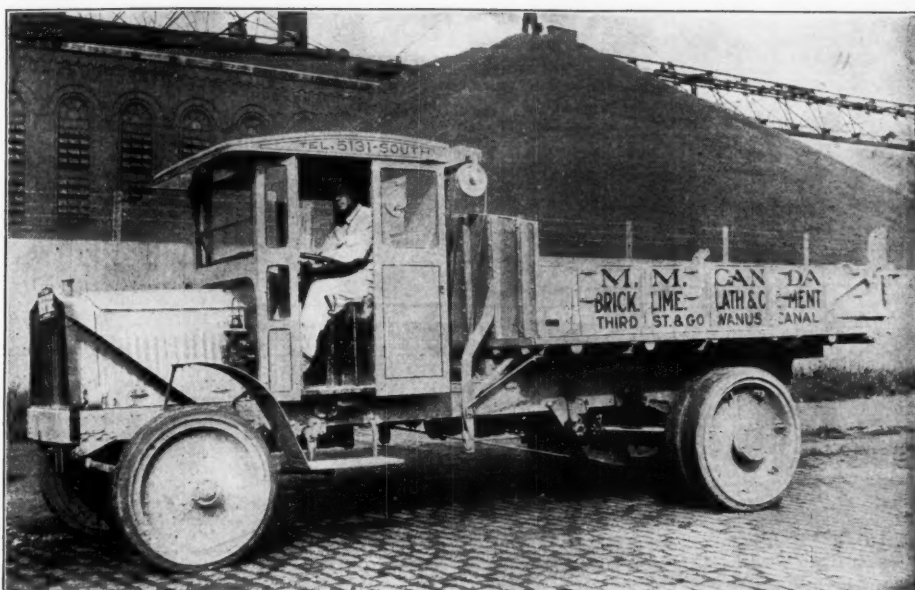
Also builders of the famous
TERRY Steel and Timber Derricks



TERRY MFG. CO.
GRAND CENTRAL TERMINAL
NEW YORK CITY

Works: Kearny, N. J.





Packard Truck delivering Building Materials. The growing preference in the building trades for the Packard is a matter of economy over a term of years as compared with the deceptive low first cost of the average assembled truck.

Can the Building Supply Dealer Further Lower His Costs

IN no other industry does the right choice of a truck produce such substantial savings as in the building supply business. That is the reason the far-sighted Building Supply Dealer is coming to demand facts and figures on truck performance that will bear the closest scrutiny.

The Packard people do not pretend to authority on any subject except *transportation*. But they can show the American business man records of *savings in trucking costs*—10 per cent in gasoline, 18 to 22 per cent in time, up to 30 per cent in ton-mile cost.

They can show him, too, how to apply the same methods to his own business.

Packard has done away with the excess costs in gasoline, not only through the remarkable ability of the Packard Truck Engine, but especially by means of the Packard carbureter.

Here is a carbureter built especially to stand the vibration of a truck at work. The float feed positive and *precise*. The carbureter water-jacketed and mounted high up on the cylinder *bloc*; so that the gas is warmed by the motor, and fed to the engine ready to flash into power.

Packard does away with excess friction and oil wastage, by the *precise* and positive *alignment* of parts from end to end of transmission.

It saves oil again by the *close fitting* of pistons and rings—and by preventing loss of oil through drip.

It saves tires by *distribution of load*, by the positive and uniform action of the clutch—in fact, by the engineering design of the whole Packard rear end.

Dynamometer tests on Packard Trucks show that the Packard delivers 86 per cent of *Engine-power* to the rear wheels on *low gear* and 94 per cent on *high*.

The Building Supply Dealer who applies these facts to his own trucking problems will enjoy a definite increase in profits from his reduced operating costs.

"Ask the Man Who Owns One"

PACKARD MOTOR CAR COMPANY, Detroit

Buyers' Guide of the Rock Products Industry

Classified Directory of Advertisers in Rock Products

Air Compressors

Worthington Pump & Mach. Co.
New York, N. Y.

Bags and Bag Machinery

Bates Valve Bag Co.
Chicago, Ill.
Jaite Co., The
Jaite, Ohio
Valve Bag Co. of America
Toledo, Ohio.

Belting

Cincinnati Rubber Mfg. Co.
Cincinnati, Ohio.
Hettrick Mfg. Co.
Toledo, Ohio
Main Belting Co.
Philadelphia, Pa.
New York Belting & Packing Co.
New York, N. Y.
U. S. Rubber Co.
New York, N. Y.

Belt Fasteners

Crescent Belt Fastener Co.
New York, N. Y.

Belt Lacing

Crescent Belt Fastener Co.
New York, N. Y.

Belt Rivets

Crescent Belt Fastener Co.
New York, N. Y.

Brick Machines

Wert Mfg. Co.
Chicago, Ill.

Blasting Supplies

Du Pont de Nemours & Co., E. I.
Wilmington, Del.
Grasselli Powder Co.
Cleveland, Ohio.

Buckets, Elevator

Hendrick Mfg. Co.
Carbondale, Pa.
Orton & Steinbrenner
Chicago, Ill.

Buckets

Advance Eng. Co.
Cleveland, O.
Brown Hoisting Mach. Co.
Cleveland, Ohio.
Browning Co.
Cleveland, Ohio.
Buffalo Hoist & Derrick Co.
Buffalo, N. Y.
Marion Steam Shovel Co.
Marion, Ohio.
McMyler Interstate Co.
Cleveland, Ohio.
Owen Bucket Co.
Cleveland, Ohio.

Calcing Machinery

Atlas Car & Mfg. Co.
Cleveland, Ohio.
Butterworth & Lowe
Grand Rapids, Mich.

Chains and Transmitting Machinery

Columbus-McKinnon Chain Co.
Columbus, O.
U. S. Chain & Forging Co.
Pittsburgh, Pa.

Chains, Dredge

U. S. Chain & Forging Co.
Pittsburgh, Pa.

Conveyors and Elevators

Caldwell H. W., & Son Co.
Chicago, Ill.
Gifford-Wood Co.
Hudson, N. Y.
Jeffrey Mfg. Co., The
Columbus, Ohio.

Link Belt Co.
Chicago, Ill.
Robins Conveying Belt Co.
New York, N. Y.
Smith Eng. Works
Milwaukee, Wis.
Stephens-Adamson Mfg. Co.
Aurora, Ill.
Sturtevant Mill Co.
Boston, Mass.
Universal Road Mach. Co.
Kingston, N. Y.

Cranes—Locomotive Gantry

American Crane & Eng. Co.
Toledo, Ohio.
Advance Eng. Co.
Cleveland, O.
Ball Engine Co.
Erie, Pa.
Brown Hoisting Mach. Co.
Cleveland, Ohio.
Browning Co.
Cleveland, Ohio.
Byers Mach. Co., John F.
Ravenna, Ohio.
Chisholm-Moore Mfg. Co.
Cleveland, Ohio.
McMyler-Interstate Co.
Cleveland, Ohio.
Ohio Locomotive Crane Co.
Bucyrus, Ohio.
Orton & Steinbrenner
Chicago, Ill.
Osgood Co., The
Marion, Ohio.

Crushers and Pulverizers

Allis-Chalmers Mfg. Co.
Milwaukee, Wis.
American Pulverizer Co.
St. Louis, Mo.
Bacon, Earle C., Inc.
New York, N. Y.
Buchanan Co., Inc., C. G.
New York, N. Y.
Bradley Pulverizer Co.
Allentown, Pa.
Butterworth & Lowe
Grand Rapids, Mich.
Chalmers & Williams
Chicago Heights, Ill.
Good Roads Mach. Co.
Philadelphia, Pa.
Gruendler Pat. Crusher & Pulv. Co.
St. Louis, Mo.
Jeffrey Mfg. Co., The
Columbus, Ohio.
K. B. Pulverizer Co.
New York, N. Y.
Kennedy-Van Saun Mfg. & Eng. Corp.
New York, N. Y.
Kent Mill Co.
Brooklyn, N. Y.
Lewistown Fdry. & Mach. Co.
Lewistown, Pa.
McLanahan-Stone Mach. Co.
Hollidaysburg, Pa.
Munson Mill Machinery Co.
Utica, N. Y.
Pennsylvania Crusher Co.
Philadelphia, Pa.
Raymond Bros. Impact Pulverizer Co.
Chicago, Ill.
Smith & Co., F. L.
New York, N. Y.
Smith Eng. Works
Milwaukee, Wis.
Sturtevant Mill Co.
Boston, Mass.
Stevenson Co.
Wellsville, O.
Traylor Eng. & Mfg. Co.
Allentown, Pa.
Universal Crusher Co.
Cedar Rapids, Iowa.
Universal Road Mach. Co.
Kingston, N. Y.
Webb City & Carterville F. & M. Works
Webb City, Mo.
Williams Pat. Crush. & Pulv. Co.
Chicago, Ill.

Worthington Pump & Mach. Corp.
New York, N. Y.

Derricks

Buffalo Hoist & Derrick Co.
Buffalo, N. Y.
Terry Mfg. Co.
New York, N. Y.

Dipper Teeth

American Manganese Steel Co.,
Chicago Heights, Ill.
Taylor-Wharton Iron & Steel Co.
High Bridge, N. J.

Dragline Buckets

Brown Hoisting Mach. Co.
Cleveland, Ohio

Drills

American Well Works
Aurora, Ill.
Armstrong Mfg. Co.
Waterloo, Iowa.
Sanderson Cyclone Drill Co.
Orrville, Ohio
Wood Drill Works
Paterson, N. J.

Dryers

American Process Co.
New York City.
Ruggles-Coles Eng. Co.
New York, N. Y.
Vulcan Iron Works
Wilkes-Barre, Pa.

Dynamite

Du Pont de Nemours & Co., E. I.
Wilmington, Del.
Grasselli Powder Co.
Cleveland, Ohio.

Engines, Oil & Gas

Worthington Pump & Mach. Co.
New York, N. Y.

Engines, Steam

Morris Mach. Works
Baldwinsville, N. Y.

Engineers

Arnold & Weigel
Woodville, Ohio
Bacon, Earle C., Inc.
New York, N. Y.
Bradley Pulv. Co.
Allentown, Pa.
Buckbee Co., J. C.
Chicago, Ill.
Fuller Engineering Co.
Allentown, Pa.
James N. Hatch
Chicago, Ill.
R. W. Hunt & Co.
Chicago, Ill.
Massey Co., Geo. B.
Chicago, Ill.
Ross Engineering Co.
Chicago, Ill.
Smith & Co., F. L.
New York, N. Y.
Schaffer Eng. & Equip. Co.
Pittsburgh, Pa.
Yates, Preston K.
New York, N. Y.

Excavators

Ball Engine Co.
Erie, Pa.
Green, L. P., Chicago, Ill.
Marion Steam Shovel Co.
Marion, Ind.
Owen Bucket Co.
Cleveland, Ohio.

Excavators—Dragline Cableway

Link Belt Co.
Chicago, Ill.
Railway & Ind. Eng. Co.
Greensburg, Pa.

Sauerman Bros.
Chicago, Ill.

Explosives
Du Pont de Nemours & Co., E. I.
Wilmington, Del.
Grasselli Powder Co.
Cleveland, Ohio.

Fuses
Insign-Bickford Co.
Simsbury, Conn.

Gas Producers
Chapman Eng. Co.
Mt. Vernon, Ohio.
Cooper Co., C. & G.
Mt. Vernon, Ohio
Morgan Construction Co.
Worcester, Mass.

Gears
Caldwell, H. W. & Son Co.
Chicago, Ill.

Generators
Sorgel Electric Co., Milwaukee, Wis.

Glass Sand Equipment
Lewistown Fdy. & Mach. Co.
Lewistown, Pa.

Grinding Mills
Munson Mill Machinery Co.
Utica, N. Y.

Hoists
Buffalo Hoist & Derrick Co.
Buffalo, N. Y.
Chisholm-Moore Mfg. Co.
Cleveland, Ohio
Flory Mfg. Co., S.
New York City.
Vulcan Iron Works
Wilkes-Barre, Pa.

Hose—Water, Steam, Air Drill, Pneumatic Tool
Cincinnati Rubber Mfg. Co.
Cincinnati, O.
N. Y. Belting & Packing Co.
New York, N. Y.

Hydrating Machinery
Atlas Car & Mfg. Co.
Cleveland, Ohio
Kritzer Co., The
Chicago, Ill.
Miscampbell, H.
Duluth, Minn.
Schaffer Eng. & Equip. Co.
Pittsburgh, Pa.

Hydraulic Dredges
Morris Machine Works
Baldwinsville, N. Y.

Industrial Cars
Atlas Car & Mfg. Co.
Cleveland, Ohio
Continental Car Co.
Louisville, Ky.
Easton Car & Constr. Co.
Easton, Pa.
Koppel Indust. Car & Equip. Co.
Koppel, Pa.
Watt Mining Car Wheel Co.
Barnesville, Ohio

Lime Kilns
Arnold & Weigel
Woodville, Ohio
Stacy-Schmidt Mfg. Co.
York, Pa.
Vulcan Iron Works
Wilkes-Barre, Pa.

Loaders and Unloaders
Austin Machinery Corp.
Chicago, Ill.
Ball Engine Co.
Erie, Pa.
Gifford-Wood Co.
Hudson, N. Y.
Jeffrey Mfg. Co., The
Columbus, Ohio

Locomotives
Baldwin Locomotive Works, The
Philadelphia, Pa.
Fate-Root-Heath Co.
Plymouth, Ohio
Hadfield-Penfield Steel Co.
Bucyrus, O.

Jeffrey Mfg. Co., The
Columbus, Ohio
Lima Locomotive Works
New York, N. Y.
Porter Co., H. K.
Pittsburgh, Pa.
Vulcan Iron Works
Wilkes-Barre, Pa.
Whitcomb Co., Geo. D.
Rochelle, Ill.

Motors, Electric
Gifford-Wood Co.
Hudson, N. Y.
Sorgel Electric Co., Milwaukee, Wis.

Motor Trucks
Packard Motor Car Co.
Detroit, Mich.
Pierce-Arrow Motor Car Co.
Buffalo, N. Y.

Packing—Sheet, Piston, Superheat, Hydraulic
Cincinnati Rubber & Mfg. Co.
Cincinnati, Ohio
N. Y. Belting & Packing Co.
New York, N. Y.

Paint and Coatings
Williams, C. K., & Co.
Easton, Pa.

Perforated Metals
Chicago Perforating Co.
Chicago, Ill.
Cross Eng. Co.
Carbondale, Pa.
Hendrick Mfg. Co.
Carbondale, Pa.
Nortmann Duffke Co.
Milwaukee, Wis.

Plaster Machinery
Butterworth & Lowe
Grand Rapids, Mich.
Fhrsam & Sons Co., J. B.
Enterprise, Kan.

Portable Conveyors
Stephens-Adamson Mfg. Co.
Aurora, Ill.

Pumps
American Manganese Steel Co.
Chicago Heights, Ill.
American Well Works
Aurora, Ill.
Morris Machine Works
Baldwinsville, N. Y.
Worthington Pump & Mach. Co.
New York, N. Y.

Power Transmitting Machinery
Caldwell H. W., & Son Co.
Chicago, Ill.

Powder
Du Pont de Nemours & Co., E. I.
Wilmington, Del.
Grasselli Powder Co.
Cleveland, Ohio

Pulverized Fuel Equipment
Bradley Pulv. Co.
Allentown, Pa.
Raymond Bros. Impact Pulv. Co.
Chicago, Ill.

Pump Valves
N. Y. Belting & Packing Co.
New York, N. Y.

Quarry Equipment
Marion Steam Shovel Co.
Marion, Ohio
Universal Road Mach. Co.
Kingston, N. Y.

Rails
Hyman-Michaels Co.
Chicago, Ill.

Rope, Wire
American Steel & Wire Co.
Chicago, Ill.
Leschen, A. & Sons Co.
St. Louis, Mo.
Waterbury Co.
New York, N. Y.

Scrapers, Drag
Green, L. P., Chicago, Ill.
Sauerman Bros.
Chicago, Ill.

Screens
Cross Eng. Co.
Carbondale, Pa.
Gifford-Wood Co.
Hudson, N. Y.
Hendrick Mfg. Co.
Carbondale, Pa.
Jeffrey Mfg. Co., The
Columbus, Ohio
Link Belt Co.
Chicago, Ill.
National Engineering Co.
Chicago, Ill.
Ross Eng. Co.
Chicago, Ill.
Smith Eng. Works
Milwaukee, Wis.
Stephens-Adamson Mfg. Co.
Aurora, Ill.
Stimpson Equip. Co.
Salt Lake City, Utah
Sturtevant Mill Co.
Boston, Mass.
Tyler Co., The W. S.
Cleveland, Ohio
Universal Road Mach Co.
Kingston, N. Y.

Separators
Rupert M. Gay Co.
New York City.
National Engineering Co.
Chicago, Ill.
Raymond Bros. Impact Pulv. Co.
Chicago, Ill.
Sturtevant Mill Co.
Boston, Mass.
Tyler Co., The W. S.
Cleveland, Ohio

Separators, Magnetic
Buchanan Co., C. G., Inc.
New York, N. Y.

Sheave Blocks
Mining Mach. Co.
Mountville, Pa.

Shovels—Steam and Electric
Ball Engine Co.
Erie, Pa.
Bucyrus Co.
S. Milwaukee, Wis.
Marion Steam Shovel Co.
Marion, Ohio
Osgood Co., The
Marion, Ohio

Shoveling Machines
Myers-Whaley Co.
Knoxville, Tenn.

Speed Reducing Transmission
James, D. O., Mfg. Co.
Chicago, Ill.

Testing Sieves and Testing Sieve Shakers
Tyler Co., The W. S.
Cleveland, Ohio

Track Equipment
Central Frog & Switch Co.
Cincinnati, Ohio

Trolleys
Brown Hoisting Mach. Co.
Cleveland, Ohio

Washers, Sand and Gravel
Allen Cone Co.
El Paso, Tex.
Link Belt Co.
Chicago, Ill.
Smith Eng. Works
Milwaukee, Wis.

Wire Rope
American Steel & Wire Co.
Chicago, Ill.
Leschen, A. & Sons Co.
St. Louis, Mo.
Waterbury Co.
New York, N. Y.

Wire Cloth
Cleveland Wire Cloth Co.
Cleveland, Ohio
Tyler Co., The W. S.
Cleveland, Ohio

Free Service to Readers of

Rock Products

If you are in the market for any kind of machinery, equipment or supplies, or if you desire catalogs, information or prices on any product, simply check off your wishes on the following list and mail to ROCK PRODUCTS. We are at your service—to obtain for you, without expense, catalogs, prices or specific information on every kind of machinery, equipment and supplies—or to help you find the hard to find source of supply. Instead of writing to many concerns or spending time hunting up information, etc., the one request to ROCK PRODUCTS brings the complete data you desire.

What can we do for you? Use the following list for convenience. Check what you are in the market for, sign and mail to us.

RESEARCH SERVICE DEPARTMENT

ROCK PRODUCTS, 542 So. Dearborn St., Chicago, Illinois

Please send me catalogs and prices concerning the following items checked below:

- | | | | |
|------------------------------|-----------------------------------|--|-------------------------------|
| Air Compressors. | Dragline Excavators. | Lathes. | Rock Drills. |
| Anvils. | Dragline Cableway. | Lights, Carbide. | Rope Drive. |
| Bags. | Excavators. | Lime Hydrators. | Rope, Manila. |
| Bag Printing Machines. | Dredging Pumps. | Lime Kilns. | Safety Clothing, Etc. |
| Bagging Machines. | Drill Steel. | Loaders, Car. | Sand-Lime Brick Mch. |
| Belt Dressings. | Drill Sharpening Machinery. | Loaders, Wagon. | Sand Pumps. |
| Belting, Conveying. | Drills, Blast Hole. | Locomotive Cranes. | Sand Washing Boxes. |
| Belting, Transmission. | Drills, Hand Hammer. | Locomotives, Electric. | Scrapers. |
| Bins. | Drills, Tripod. | Locomotives, Gasoline. | Screening Equipment. |
| Bin Gates. | Dryers, Sand and Stone. | Locomotives, Steam. | Screening Plants. |
| Blast Hole Drills. | Dynamite. | Locomotives, Storage Battery. | Screens. |
| Blasting Powder. | Dump Cars. | Machine Shop Equipment. | Sheaves. |
| Bodies, Motor Truck. | Dump Wagons. | Magnetic Separators. | Steam Shovels. |
| Boilers. | Dust Collecting Systems. | Motors. | Steel, High Speed. |
| Buckets. | Elevators and Conveyors. | Motor Trucks. | Steel, Manganese. |
| Buildings, Portable. | Elevating Equipment. | Oil Storage. | Stokers, Automatic. |
| Cable Coatings. | Engineering Service. | Oils and Lubricants. | Stone Grapple. |
| Cableways. | Engines, Gasoline. | Packing, Hydraulic. | Tanks, Steel. |
| Calcining Machinery. | Engines, Oil. | Packing, Piston. | Tanks, Wood. |
| Cars. | Fire Brick. | Packing, Sheet. | Time Clocks. |
| Car Fullers. | Forges. | Packing, Superheat. | Tracks. |
| Car Replacers. | Frogs and Switches. | Paints and Coatings. | Track Material. |
| Chain Drive. | Gas Producers. | Perforated Metal. | Transformers, Electric. |
| Chain Hoists. | Gear Speed Reducers. | Picks. | Trip Hammers. |
| Chains, Steel. | Gears. | Pipe, Iron. | Unloaders. |
| Clips, Wire Rope. | Generators, Electric. | Power Transmitting Equip-
ment. | Valves. |
| Clutches. | Hand Shovels. | Pulleys. | Washing Equipment. |
| Compressors. | Hoisting Engines. | Pulverizers. | Weighing Equipment. |
| Conveying Equipment. | Hoists. | Pumps, Centrifugal. | Welding, Electric. |
| Conveyors. | Hose, Air Drill. | Pumps, Electric. | Welding, Oxy-Acetylene. |
| Cranes. | Hose, Pneumatic Tool. | Pumps, Gasoline. | Winches. |
| Crusher, Parts. | Hose, Steam. | Pumps, Steam. | Wire Cloth. |
| Crushing Plants. | Hose, Water. | Pyrometers. | Wire Rope. |
| Crushers. | Hydraulic Dredges. | Rails. | Wrenches. |
| Derricks. | Industrial Railways. | | |

Where Can I Buy.....

Who Manufactures

Am in the Market for.....

Name

Address

City State

INDEX TO ADVERTISEMENTS

Advance Engineering Co.....	95	Green, L. P.....	108	Pennsylvania Crusher Co.....	Inside front cover
Alto-Chalmers Mfg. Co.....	7	Grundler Pat. Crusher & Pulv. Co.....	Inside back cover	Porter Co., H. K.....	Inside back cover
American Crane & Eng. Co.....	95				
American Manganese Steel Co.....	25	Hadfield-Penfield Steel Co., The.....	29	Railway & Industrial Eng. Co.....	14
American Process Co.....	Inside front cover	Hatch, James N.....	94	Raymond Bros. Impact Pulv. Co.....	26
American Pulverizer Co.....	103	Hendrick Mfg. Co.....	94	Robins Conveying Belt Co.....	94
American Steel & Wire Co.....	98	Hettrick Mfg. Co.....	100	Ross Eng. Co.....	101
American Well Works.....	105	Hunt, R. W. & Co.....	94	Ruggles Coles Eng. Co.....	Inside front cover
Armstrong Mfg. Co.....	22	Hymen-Michaels Co.....	109		
Arnold & Weigel.....	104			Sanderson Cyclone Drill Co.....	10-11
Atlas Car & Mfg. Co.....		Jaite Co., The.....	Inside front cover	Sauerman Bros.....	21
Baldwin Locomotive Works.....	24	James Mfg. Co., D. O.....	108	Schaffer Eng. & Equip. Co.....	103
Ball Engine Co.....	19	Jeffrey Mfg. Co., The.....	18	Smith, F. L., & Co.....	94
Bates Valve Bag Co.....	98			Smith Eng. Works.....	4
Bradley Pulverizer Co.....	33	K-B Pulverizer Co., Inc.....	99	Sorgel Electric Co.....	93
Brown Hoisting Machinery Co.....	3	Kennedy Van Saun Mfg. & Eng. Corp.....	98	Steady-Schmidt Mfg. Co.....	Inside front cover
Browning Co., The.....	Inside front cover	Kent Mill Co.....	110	Stephens-Adamson Mfg. Co.....	111
Buchanan Co., C. G.....	27	Kritzer Co., The.....	96	Stevenson Co., The.....	15
Bucyrus Co.....	16			Stimpson Equip. Co.....	20
Butterworth & Lowe.....	99	Leschen & Sons Rope Co., A.....	Inside back cover	Sturtevant Mill Co.....	12
Buyers' Guide.....	116-117				
Byers Machine Co., John F.....	106	Lewistown Fdy. & Mach. Co.....	112	Taylor-Wharton Iron & Steel Co.....	17
		Lima Locomotive Works.....	110	Terry Mfg. Co.....	114
Caldwell & Son Co., H. W.....	98	Link-Belt Co.....	Back cover	Thomas Elevator Co.....	113
Central Frog & Switch Co.....	95			Traylor Eng. & Mfg. Co.....	120
Chapman Eng. Co.....	106	Marion Steam Shovel Co.....	30	Tyler Co., The W. S.....	28
Chicago Perforating Co.....	95	Massey Co., Geo. B.....	107		
Classified Advertising.....	93	McLanahan-Stone Machine Co.....	95	United States Chain & Forging Co.....	96
Cleveland Wire Cloth Co.....	6	McMyler Interstate Co.....	100	Universal Crusher Co.....	101
Columbus-McKinnon Chain Co.....	105	Mining Machine Co.....	97	Universal Road Mach. Co.....	97
Continental Car Co.....	99	Miscampbell, H.....	100	Used Equipment.....	91-92-93
Cooper Co., C. & G.....	106	Morris Machine Works.....	31	U. S. Rubber Co.....	Front cover
Cross Eng. Co.....	104	Morgan Construction Co.....	111		
		Munson Mill Mach. Co.....	107	Vulcan Iron Works.....	9
Easton Car & Construction Co.....	102	Myers-Whaley Co.....	5		
Ehrsam & Sons Co., J. B.....	94			Watt Mining Car Wheel Co.....	96
Ensign-Bickford Co.....	23	National Engineering Co.....	102	Webb City & Carterville Foundry & Machine Works.....	97
Erie Steam Shovel Co.....	19	New York Belting & Packing Co.....	1	Wert Mfg. Co.....	101
		Nortmann-Duffke Co.....	95	Whitcomb Co., Geo. D.....	97
Fate-Root-Heath Co.....	34	Ohio Locomotive Crane Co.....	94	Williams, C. K., & Co.....	93
Flory Mfg. Co., S.....	102	Orton & Steimbrenner.....	96	Williams Patent Crusher Co.....	100
Fuller Engineering Co.....	93	Osgood Co., The.....	13		
		Owen Bucket Co.....	94	Yates, Preston K.....	94
Gay Co., Rupert M.....	109	Packard Motor Car Co.....	115		
Gifford-Wood Co.....	99				
Good Roads Mach. Co.....	32				

In 1921,

read the authoritative journal of your industry to keep in closest touch with constantly changing conditions, prices, methods.

Rock Products is the authoritative business and technical journal of the rock products industry.

(SUBSCRIPTION COUPON)

ROCK PRODUCTS

542 So. Dearborn St., Chicago, Ill.

We produce:

- | | |
|--|------------------------------------|
| <input type="checkbox"/> Crushed Stone | <input type="checkbox"/> Gypsum |
| <input type="checkbox"/> Sand & Gravel | <input type="checkbox"/> Phosphate |
| <input type="checkbox"/> Glass Sand | <input type="checkbox"/> Cement |
| <input type="checkbox"/> Lime | <input type="checkbox"/> Talc |
| <input type="checkbox"/> Sand-Lime Brick | <input type="checkbox"/> Slate |

Please enter my subscription to ROCK PRODUCTS for..... years (\$2.00 one year, \$3.00 two years).

I enclose \$.....to cover.

My name is.....

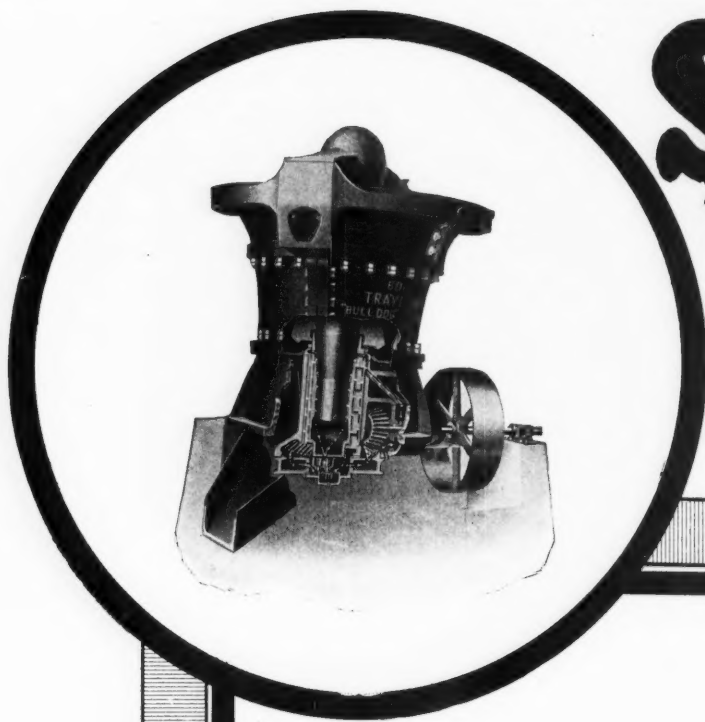
My address is.....

City..... State.....

(Canadian and Foreign Subscriptions \$3.00 a Year)

1-1

When writing advertisers please mention ROCK PRODUCTS



Strong

Where other Gyratories are Weak

Write for our Bulletin RGX-1 today—it's worth-while reading for anyone interested in the best there is in gyratory crushers. It fully describes the many exclusive

Bulldog Features

—the Bend-Proof Shaft—the Hewes Spider—the Cut Steel Gears that run in oil—the Perfect Force Feed lubricating system. But this space is limited, so get the Bulletin—it's convincing.

Traylor Motor Trucks

like Bulldog Crushers, are built right, stay right, and will do your hauling right—and they come in a complete unit ready to go into immediate service. Send for complete data.



TRAYLOR TRUCKS
Made in 1½ to 4 Ton Capacities

Traylor Engineering & Manufacturing Co.

Main Offices and Plant: ALLENTOWN, PA.

NEW YORK
30 Church St.

PITTSBURGH
211 Fulton Bldg.

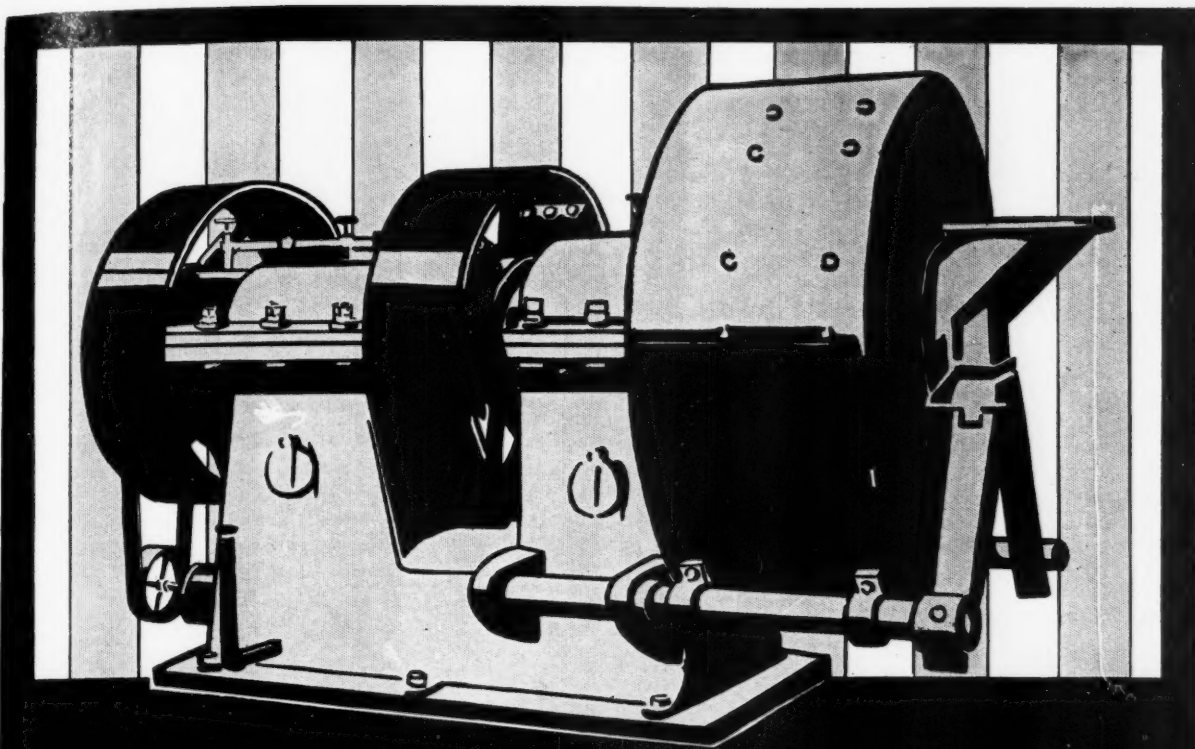
CHICAGO
1414 Fisher Bldg.

LOS ANGELES
Citizens Bank Bldg.

SPOKANE
Mohawk Block

Truck and Tractor Division: Cornwells, Bucks Co., Pa.

When writing advertisers please mention ROCK PRODUCTS



SYMONS DISC CRUSHERS

Whether it be one machine or a complete plant, we want the opportunity of figuring with you. Our engineers are at your service in the design of your plant and are in a position to go into the smallest detail of the arrangement of your reduction equipment.

Symons Horizontal
Disc Crushers as
Intermediate
Breakers

Gyratory and Jaw
Crushers for Initial
Breakers

Ball Mills and Tube
Mills for Finish
Grinding

Symons Vertical
Disc Crushers as
Intermediate or
Finishing Crushers

Crushing Rolls as
Intermediate
Crushers

Pulsating and
Revolving Screens

CHALMERS & WILLIAMS

1425 Arnold Street Chicago Heights, Illinois

New York
120 Broadway

Chicago
208 S. La Salle St.

Los Angeles
933 Central Bldg.

San Francisco
1306 Merchants Natl.
Bank Bldg.

Salt Lake City
307 Dooley Block

Portland
1207 Gasco Bldg.

Seattle
L. C. Smith Bldg.

When writing advertisers please mention ROCK PRODUCTS